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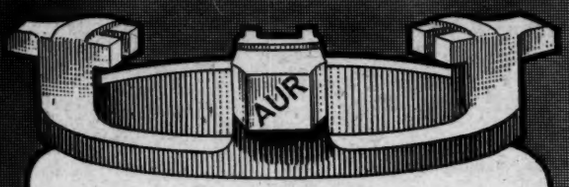

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLVII., No. 2937.] TUESDAY, AUGUST 26, 1919. [71ST YEAR.

EDITORIAL NOTES.

The Industrial Position and Trade Policy.

THE long anticipated speech of the Prime Minister on the industrial position and the policy of the Government in relation thereto, and to trade generally, was vastly disappointing, except in one respect, and that was as to the announcement of the Government's decision to steer clear, while nationalizing minerals, of the nationalization of the coal mines, and instead to place them under a system of control. Regarding the industrial and trade situation, the country had looked for a definite lead from the Government; but there was nothing save, on the one hand, a mass of hideous-looking figures which confirm the terrible gravity of our financial position, and, on the other hand, a collection of generalities which show that the Government have settled upon certain objectives in attempting to revivify and strengthen the industrial and trade energies of the country, but that they have not at present any determinate views as to the routes they should take in attaining these objectives. The Government appear to be in just as big a muddle and state of uncertainty as the country itself. Figures were supplied in abundance as to the stupendous debt that we as a nation have contracted during the war, as to the big financial drag that this represents upon the country annually in interest and sinking fund, and as to the large adverse trade balance which we now have, and which, if it continues, will mean national ruin. The only way of salvation is increased production.

All this the country has heard before. The dire fiscal position is not fresh intelligence, nor is the fact that imports are so greatly in excess of exports, and that we are not paying our way. The Chancellor of the Exchequer has tried to arouse the country to its insecurity; but the knowledge of the critical conditions has not set the nation to work in any united endeavour to change or extinguish them. The fact of the matter is that nothing much can or will be done until the Government itself has given a lead, and has produced the conditions necessary to confidence. Everything that contributes to confidence, and that can assist industry, has been crippled; and it is for the Government, guided by the best available experts, to work to bring about (it is recognized they cannot be precisely of pre-war character) conditions—in regard to finance, labour, and materials—that will conduce to confidence. The Government, through the Prime Minister, appeals to industry; while industry, in turn, appeals to the Government. It is not any settled lethargy nor unwillingness that holds industry back. But there is a reluctance to enter into contracts on the part of buyers while things are as they are; and there is hesitation on the part of manufacturers to extend their liabilities until they can gauge more accurately than at present where they stand. If we are to have increased production, conditions must be there which will stimulate it. This is fundamental to all; the absence of these conditions being fatal to any solid advance. Labour is blamed; and employers are censured. This is not sufficiently comprehensive. No doubt the extreme demands of labour are partly to blame; and industrial administration is not wholly free from fault. But the Government should be arraigned with them, and perhaps as the chief of those guilty in this matter. However that may be, the Government have to face the fact that so long as things remain as they are, so long as there is disturbance and uncertainty, so long will there be under-production. On this fact the Government must concentrate.

The Prime Minister suggests that the causes of shrinkage in production are transport, shortage of labour, labour unrest, and restrictions. Transport is to be dealt with under the Ways and Communications Bill; but the scheme is a big thing, and will require much time for development, let alone execution. As to the shortage of labour, 3,600,000 men have been demobilized; and 10 per cent. of them have not yet been absorbed. As to labour unrest, the Government and the war are largely responsible for it. The extremists saw their opportunity, and took it; and the Government became the governed, and the yielding victims of coercion. Now the Government have drafted two revolutionary Bills which provide for the State regulation of the hours and wages of labour; and so limits for good in these respects the operation of economic laws. One Bill provides for a working week of not exceeding forty-eight hours in, with few exceptions, all industries; and the payment for overtime is to be not less than 25 p.ct. The other is to secure a living wage for all persons of fifteen years of age and upwards; the rates to be fixed after inquiry into the whole subject of wages. Seeing that the vast majority of workers are now employed for forty-eight hours or under per week, and that wages are what they are, the proposed legislation will not greatly affect the situation; but it will under any circumstances prevent a reversion to the old order of things. The two Bills are the outcome of the National Industrial Conference last February, when the scheme was also put forward for establishing a National Industrial Council.

But to return to the Premier's proposals. He made a cogent appeal to labour to reconsider the problem of profit-sharing. The past short-sightedness of some of our statesmen in this particular is confirmed by this appeal. Profit-sharing or co-partnership, with a financial interest and direct concern in the management, has long been proposed from, and practised in, the gas industry as a large and effective contribution to the solution of the labour problem; and we are convinced that had the war been entered upon with this united interest an established fact in industry generally, a considerable part of the trouble to which the country has been subjected, much of the expense to which it has been permanently put, and a substantial part of the drawbacks from which industry is suffering to-day, would never have obtained, and the spirit of co-operation would have been more prevalent. Then import restrictions are to be removed on Sept. 1. There will be some interest—not to say anxiety—to see exactly what is compassed by this removal, as there is still to be some defence of industry against dumping and unfair competition, and certain key industries—such as synthetic dyes and optical glasses and lenses—are to be protected. There was an expression of regret on the part of the Premier that the Electricity Supply Bill had not been passed into law before the recess, because, in his view, the sooner power is organized on a more satisfactory basis, the better will it be for the country. We are afraid there is going to be a large amount of disappointment on the part of the Government when the whole truth of this matter is known to them, and they learn how chimerical is that for which they have been so urgently legislating. Practical fact has greater endurance than political extravagance and fancies. The country is also promised a Bill for the control and development of water power. Where the water power is situated that is worth developing is not exactly known. From the Government programme so far as adumbrated, industry cannot hope for much immediate assistance in bringing about greater production. The Government must do something better if they are going to help the country to begin at once to retrieve its position.

Control of the Coal Mines—Nationalization Rejected.

The old theory that the reduction of already reasonable working hours and the payment of higher wages will increase employment and production has been laid to rest, save as an argument by labour demagogues for the ears of the untutored. What has been found is that labour is not prepared to sacrifice working hours, if pay is likewise to be relinquished; and that shorter hours and higher pay are the highways to reduced production, and heavier costs of living. The most vehement disproof of the labour theory has been supplied by the coal industry, and well the country knows it. Not only have shorter hours and higher wages there meant a reduction of output, but they have helped to create the adverse trade balance of which the Premier spoke, and have been the means of reducing employment in other industries through these having their efficiency diminished owing to dear coal and short and unclean supplies. Economic laws cannot be assailed with impunity, and without producing some destruction of national interests. It is therefore a disastrous policy that the miners are pursuing; and the Prime Minister proved this by unchallengeable figures as to the increase in the number of miners employed—with shorter working hours and higher rates of pay—and yet concurrently with an alarming diminution in coal output. Let us put the figures on record. In 1914, 1,110,000 men were engaged in coal mining; now there are 1,141,000. A year's production before the war amounted to 287 million tons; at the present rate of output, there will be produced 200 million tons. In 1913, the average price of a ton of coal at the pithead was approximately 10s.; on July 16 this year, 26s. "There can "be," said the Premier, "no more serious fact in the whole "of our national trade than the depression in the output of "coal. . . . Unless by concerted effort, this is removed, "the future is dark indeed." The miners talk of their patriotism, and of what they have done during the war. All honour to them. But they have not done more than the men of other industries, who are the sufferers from the tactics of those miners (or of their leaders) who have remained at home. They have wrought incalculable mischief, and have done a large share in producing worry for the country, and in raising the price of necessaries to the whole community. Patriotism is required not only in war but in peace, and especially is the genuine thing needed when we are called upon to individually and collectively repair the fearful ravages of war.

Now the Government have announced their determination not to nationalize the coal mines; and already threats are freely issued that, if the miners cannot be the absolute dictators in this matter, they will make the country acutely feel their power. The announcement of the Government has been welcomed in all quarters of industry, and by the public generally. The only objections come from the miners. But they must recognize, unless intelligence is of a very obtuse order, that public opinion upon this particular matter is behind the Government and not behind the miners' leaders. When Mr. Justice Sankey prepared his report recommending nationalization, he had not before him the evidence of the Yorkshire coal strike, nor the statement of Mr. Duncan Graham, M.P., which we brought out in a paragraph last week on the "Nationalization of the Coal Mines" [p. 384]. That Yorkshire event and that statement dispose of Mr. Justice Sankey's good-natured idea as to miners working harmoniously with the Government. The Miners' Federation were parties with the Government in the agreement as to piece rates. The strike in Yorkshire was therefore one against the Government and the Federation; and the statement of Mr. Duncan Graham divulged the view as to the necessity under nationalization of a more vigorous and strengthened organization to "fight" the Government than was the case in dealing with the coalowners.

The Government proposals as to control adopt certain of the main principles laid down in Sir Arthur Duckham's report: State purchase of mineral rights; a deduction to be made from the purchase value to create a fund for social improvement of the conditions of the industry; division of the country into mining areas; grouping of the mines in each area under a controlling body, upon which labour would be represented; and conditions duly approved by the Government for protecting the consumer, which there is some indication may take the form of a profit-sharing plan based on the price to the consumer. The details of the scheme will be submitted to the House when it reassembles after the recess. So far as the miners are concerned, coming upon the reduction of hours and the great rise in wages, the Government proposal is a concession of considerable importance. But with it all, it seems almost safe to say that the miners' leaders will not accept what is tantamount to a compromise. But the Government have public opinion behind them. They will have, in the name of the country, to clench their teeth and stand firm; for, if there is not acceptance of their plans by the miners, it will be a direct challenge to the authority of Parliament.

And what will happen if the challenge comes? This is the question that will be a source of anxiety to all consumers of coal—large ones especially, and the gas industry among them. The winter is speeding towards us; and coal stocks are low. Mr. Hartshorn, M.P., and other miners' leaders have already foreshadowed a still further reduction of output as a protest against the refusal of the Government to nationalize the mines. Compared with this fetish of nationalization, patriotism and the conditions and needs of the country are therefore small matters to the miners, if the leaders correctly interpret their views. We hope they do not. Certainly they do not represent the views of the coal consumers against whose number that of the coal miners is relatively small.

Revision of the Point of View.

Among the things that have to undergo revision or reconstruction is our point of view. This was made clear—perhaps unconsciously—by the President of the Irish Gas Managers' Association (Mr. H. W. Saville, of Wexford), in the short address which he delivered on Tuesday last, and which was published in our columns the same day. The gas industry of Great Britain has many serious grievances in respect of its treatment during the war and after; the gas industry of Ireland has felt the full brunt of ill-treatment brought to bear upon it, and it of all sections has the least resisting power through geographical situation and topographical characteristics. Meeting after meeting the troubles have been brought to notice. With them members of the Association have been struggling with might and main, and with sufficient discouragement to dishearten the strongest men. Mr. Saville touched upon some of them again in his address—the outstanding ones being coal and shipping, with regard to both of which there is just cause of complaint. We of the South of England know this only too well; and, in regard to freights, there are the costs of the running of the vessels owned by the London Gas Companies standing in proof of exorbitant charges. However, we have to look forward; and, as the President puts it, do so by taking stock of present conditions and applying them to the future. One conclusion that must be drawn from this stocktaking is that it is no earthly use turning back to pre-war conditions in making our estimates for the future. There are the soundest reasons for believing that we have done with them for good; and we have, therefore, to work and make the best of the new circumstances.

It seems to us there is a trace of pessimism in one part of Mr. Saville's remarks. This is not surprising. The conditions are enough to incline the views of the strongest optimist to stray. Pessimism, however, will not avail us in the slightest; nor will anticipation on the part of directors and their technical advisers that the good time is coming when we shall again be in proximity to our old costs. To let such a thought direct our actions to-day would be futile—perhaps disastrous. Comment is made by Mr. Saville upon the costs of labour and material. Costs, he says in effect, are now so high that an installation of vertical retorts (for example) would be so prohibitive, and would necessitate an application to Parliament for financial powers, that those who would prefer to take the proper course of scrapping plant would find it difficult to persuade their directors and committees that such action is right. This is a point worth consideration. It is clear that the time will come when it will be imperative for plant, already due for scrapping, to be demolished, if it is not to be the means of wasting money. Looking forward to that day of imperative action, what are the prospects, judging from the platform provided by current circumstance, of materials and labour falling much in cost? So far as labour is concerned, we are not very sanguine of any great difference. So far as materials are concerned, the cost of labour alone will continue to ensure a higher price for them than before the war. Our only hopes in

regard to materials are new economies in, and greater, production; while demand will exert an influence in the opposite direction. In our forecasts, the levels of value for all structural goods and commodities will have to be pitched higher than those to which we were accustomed before the war. Therefore we must revise our point of view by leaving for good pre-war levels, and consider the probabilities of the future from the new ground of to-day. Between the prices of the future and those of to-day, there will not be the difference that would be shown by making comparison with pre-war prices. But even the narrower difference which hope may picture for us between future and current costs is no certainty. Therefore, in deliberating over the question of scrapping, reconstruction, and improvement, we have to consider whether it would not be well to obtain as early as possible the monetary reward of higher manufacturing efficiency by incurring at once the probable—at any rate, the narrowed—difference in price between the future and the present. Nothing definite can be said, and no general rule can be applied. There is chance to be faced. But we cannot see any ground for expecting a heavy fall in prices. At any rate, a new point of view must be adopted.

We sympathize heartily with Mr. Saville's suggestion that the Irish gas undertakings deserve special consideration in any financial revision that is made. Some good might come from his suggestion of an interview with the Chief Secretary for Ireland. But we doubt whether—the matter being under consideration by the Board of Trade, and action probable—the Chief Secretary would move independently. His kind offices might, however, be solicited in drawing special attention to the particularly bad position of the Irish undertakings.

Steaming in Horizontals.

The steaming of horizontal retorts is a more ticklish matter than steaming verticals. Many gas men have adopted the steaming of horizontals. Some have failed; and the causes of failure are many. Sometimes it is due to the means used for the steaming; sometimes to the steaming being done on old retorts which soon have the carbon cleaned off and then become leaky; sometimes it is due to the gas becoming overloaded with carbon dioxide, owing to the unsuitable conditions of a too shallow bed of incandescent coke and excessive steaming. But if the conditions are all right, and the work is systematically done, then the steaming of horizontal retorts is a paying proposition. Success has proved this in probably more cases than failure has proved that either the conditions or the system adopted is wrong. Were it not for the capital cost, which is a consideration for small works, it would be a question whether on balance it would not in the long-run be better to utilize a separate water-gas plant for the production of the water gas. This is a larger question; and sufficient for present purposes is the fact that it has been amply proved that the correct steaming of horizontals does pay. And it pays better under the new cost conditions, which are becoming day by day more stabilized, than under the old. With labour and coal at their present prices, it is essential that maximum production within the limits of opportunity should be realized. Production, with economy and efficiency, must be the watchword of the industry to-day.

In Ireland, with all the troubles with coal, every gas engineer and manager has found it necessary to make the best use of what he could get. The President of the Irish Association (Mr. H. W. Saville, of Wexford) has been persuaded by experience that the steaming of horizontals pays; but old retorts, after steaming decarbonized them, caused a collapse through leakage. He is after a bed of retorts now on the Devon system, and (if we mistake not) is also looking longingly at verticals. At Newry, Mr. P. B. Ellacott has been gaining experience which will ensure steaming being continued as an economical practice. An account of these experiences is given in a paper he read to the Association last Tuesday. Superheating of the steam is an essential in horizontal retort working; and the first breakdown Mr. Ellacott had was in an attempt to superheat inside the retort, by using there a cast-iron channel, containing wrought-iron steam-distribution pipes. His idea in using the cast-iron channel was that "a certain amount of the oxygen of the "steam would combine with the red-hot cast iron, forming "oxide of iron, and hydrogen would be liberated—thereby "producing a gas with a higher hydrogen content and "greater calorific value." We need not discuss this. Suffice it to say the practice worked all right, until the wrought-iron pipes became choked, which, exposed to such high temperatures, was a consequence that might surely have been expected.

But Mr. Ellacott was not to be done by initial failure; and he then took the better course of external superheating, with admission of the steam at the bottom part of the back ends of four retorts—his retorts being particularly suited to the adoption of this point of admission. But even now there is the defect of insufficient contact with the incandescent coke, which is the greatest trouble in horizontal steaming. Nevertheless, he is making 14,250 c.ft. of gas per ton of coal, compared with 12,000 c.ft. without steaming. But he, like the President, is going to introduce the Devon system. The Newry steaming practice now is to carbonize for twelve hours in four retorts which are recharged regularly and in rotation, and then steam the incandesent charges for thirty-six hours for the production of water-gas. It is found that a mixed gas of a fairly even quality is thus maintained. The make of gas, we see, is increased by 2250 c.ft. per ton of coal carbonized, with the loss of 1 cwt. in the quantity of coke for sale; so that per ton of coke 44,000 c.ft. of gas is realized. During the period from November to March 31 last, 243 tons of coal (which would have cost 48s. 6d. delivered on to the works) were saved, which is a big consideration for any gas-works in Ireland. The loss in the same period in the sale of coke was 64 tons, which, calculated at the same price as the coal, means a net saving of £434 on coal in the five months. Besides this 10s. 8d. per ton of coal more revenue was realized from gas and coke (taking the same prices per 1000 c.ft. and per ton) with steaming than without; and the 10s. 8d. has to be multiplied by the 1294 tons of coal carbonized. The actual figures as to coke for sale should satisfy those who complain that the whole tale as to steaming has not been told. The practice has made all the difference to the finances of the Newry Gas-Works. Mr. Ellacott has fully proved his case, though we should have liked to have had in the paper some comparative data as to calorific power and the composition of the gas.

Benzol Detractors.

It will have been noticed that in the Daily Press just lately there has been a little ebullition of feeling on the part of some people who avow that they have found the use of benzol unfriendly disposed to their cars. This is what we should expect when impure benzol is used; the injury being testimony to impurity. Those who make complaint have the uncomfortable knowledge that their experiences are not those of thousands of other users of benzol. This points to the fact that the remedy is in their own hands. If they do not adopt it, and continue to have unpleasant experiences and advertise the fact, then one can only think that it is part of some concerted action to do the use of benzol as a motor spirit some considerable harm. There are, of course, those competitors of benzol who would be very glad to see it disgraced and out of the field; and producers of benzol who did not rectify the spirit up to the standard laid down by the National Benzol Association are simply playing into the hands of these people, and helping to depress, instead of increase, its popularity. An article on the subject by Captain E. de Normanville, R.E., appears in this issue; and he deals with the accusation made that benzol causes corrosion. If it does so, it shows that the benzol is not up to the standard specification; for the specification says "it shall be free from acids, alkalis, and sulphuretted hydrogen." There are some motor car owners who have used benzol for many years who have not had these experiences; and manufacturers of benzol ought by this time to know something about the effect of the benzol upon metals, for they have always had to use metal tanks and drums. We are glad to see that Captain Normanville calls attention to the fact that many cans and drums at present in use for benzol distribution are far from being in the condition in which they ought to be. His hints as to filtering and other matters are worth masking.

Stabilizing Prices for Castings and Pipes.

Manufacturers frequently advance their prices *pari passu* with the increase of costs, without considering whether there are not ways and means of reducing costs, and so obtaining some compensation, in other directions. There are manufacturers

whose works and foundries are not to-day nearly fully occupied, through the absence of orders. If the orders were there and the works were in full swing, manufacturing costs would, it follows, be considerably reduced. It seems to us that at the present time two factors are primarily wanted to assist to re-establish normal trade. The one is ability on the part of buyers to obtain fixed quotations; the other is a serious effort to bring down the cost of the finished article by assuming a demand which at the moment is non-existent. We take it that considerations somewhat of this kind must have been working in the minds of the Stanton Iron-Works Company, Ltd., when they indited a couple of letters which they have sent round to their customers, and copies of which have come into our hands. We have not the slightest doubt that for these letters the customers of the Company have been deeply thankful; and it is to be hoped there will be good response to the enterprise referred to in them. It is in the interests of both customers and manufacturers that a normal level of trading should be established as quickly as possible; and it is therefore for them to jointly work to that end.

Mutual Advantage in Co-operation.

The proposals require very little explanation. In spite of the fact that it is impossible to purchase raw materials which enter so largely into the manufacture of pig iron—for instance, coal and coke—without a sliding-scale clause authorizing the sellers to increase their prices if costs are advanced to them, the Stanton Company have decided to make firm quotations for castings. On July 21 the price of pig iron increased by 20s. per ton, following the advance of 6s. in the price of coal, and so all balances of orders for castings should on the same date have been automatically increased by an amount somewhat in excess of 20s. per ton. But in the hope of reducing manufacturing costs by encouraging further business, the Company have decided not to make any advance, either on the unexecuted part of existing orders or on new orders placed in the immediate future. The same thing applies to cast-iron pipes. When foundries are only working to about 25 p.ct. of their normal capacity owing to the lack of orders, then it is at once seen that there is scope there, by filling up the large void, to obtain some compensation for the further advance of costs by reducing manufacturing costs. In short, what the Stanton Company are out for is to get purchasers to see that there are possibilities of mutual and material benefit in co-operation in the circumstances of the times. At any rate, they have shown a willingness to make a trial to see whether the last increase in the cost of fuel, and therefore of pig iron, cannot be wiped-out, or largely so, in this way. We trust the result will afford good proof that it can be.

Synthetic Nitrogen Products.

The newspapers are saying that the nitrate works at Billingham which are Government property are in search of a buyer. There appears to be strong anxiety in some quarters that the manufacture of synthetic ammonia should be established in this country (though America has not met with perfect success), and that the work of the Nitrogen Products Committee shall bear good fruit. One suggestion is that the factory should be purchased by a Syndicate formed by the industries concerned, and that they should continue the research. The hope is held out that a Syndicate of the kind will have birth. It is argued that the manufacture of synthetic ammonia is necessary for national safety, and to prevent Chile nitrate taking flight to an unheard-of level of price. But above all it is hoped that the results of the excellent work of the Nitrogen Products Committee will not be lost, but will be the basis from which to make progress by systematic exploration.

Housing Schemes and Flats.

Our electrical contemporaries give the gas industry credit for having the housing scheme question well in hand, though they are of opinion that the working-class occupants of the houses should now be opulent enough to indulge in electricity for all purposes. There is another phase of the schemes for housing on which a close watch for opportunities must be kept by gas undertakings. There are a great number of big houses of a somewhat old-fashioned type which can be very conveniently converted into flats; and encouragement is being given by the Ministry of Health to this method of quick provision. It is stated that in London more than 700 such buildings have already been earmarked for the purpose. It is a good use to which to put empty property of the kind, although it is against one of the principles in the housing schemes, which aims at giving householders more elbow room and breathing space. We see that up to Aug. 16, the Ministry of Health reports, that there had been submitted 4172 housing schemes, comprising 43,000 acres, and about 430,000 houses.

Articles that may not be Imported.

The announcement of Mr. Lloyd George that import restrictions would be removed on Sept. 1 has created some consternation in industry; and already the British Engineers' Association have declared, by a resolution of the Council, that some measure of protection will have to be provided for the engineering industry if it is to thrive to the extent required to afford any prospect of fulfilling the new standard of life expectations of the workmen. The Government are placing some restrictions on dumping for the protection of certain "key" industries which are not yet sufficiently well-established here to protect themselves. Announcement has been made of certain exceptions which will not come under the general licence to import. Among the exceptions we see are coal-tar intermediates, dyes, synthetic drugs and antiseptics, optical glass, scientific glassware, illuminating glassware, laboratory porcelain, scientific instruments, thorium nitrate, gas mantles and rings, and gauges.

Yorkshire Coal Strike.

There is no open active trouble in the coalfields at the moment; but (with nationalization being pondered over) what the morrow may bring forth, one does not know. West Yorkshire has followed the lead of South Yorkshire; and the miners are either back at work, or anxious to be so as soon as the mess that their own stupidity created has been cleared up. The five weeks' stoppage, it is estimated, has meant 4 million tons of output lost to the country. This loss is being missed now; it will be missed more so in the winter. And the country will not forget.

Gas from Town Sewage.

The last issue of the "Technical Supplement to the Review of the Foreign Press" notices an article on this subject in the May 24 issue of the "Journal für Gasbeleuchtung." It is pointed out that the problem of utilizing the defecated solid matters deposited from town sewage is receiving attention in Germany. A Commission appointed by the town of Brünn has for some time past been engaged in an inquiry connected with this problem. By gasifying the substance, it may be used as a fuel for industrial heating purposes, and even for lighting. Analysis of the dried material from the Brünn sewage works showed 4·98 p.ct. of fatty matters, 3·02 p.ct. of nitrogen, and 40·09 p.ct. of ash. The elementary composition of this material was found to be (as a mean) 31·04 p.ct. of carbon, 3·95 p.ct. of hydrogen, 2·87 p.ct. of nitrogen, and 35·40 p.ct. of oxygen. Its heating nature is given as 2908 calories. Experiments in gasifying the dried material resulted in 23·3 cb.m. of gas from 100 kilos. Theoretically, the production of gas should have been 28·9 to 30·4 cb.m. Later experiments under improved conditions gave 28·6 cb.m. per 100 kilos.; the heating value of this gas being 4490 calories, against 4587 calories for coal gas. The author discusses the question at some length, reserving his conclusions for another article.

Advertising Gas and Appliances.

In an appreciative article entitled "How John Bull Advertises Gas and Appliances," Mr. C. W. Pierson, in the pages of the New York "Gas Age," explains the continuous publicity campaign of the British Commercial Gas Association, and remarks that a great opportunity lies before the Advertising Section of the American Gas Association for similar work in the United States. The campaign of the "B.C.G.A.," he says, has brought dividends, not only in increased sales of gas and gas appliances, but also in that most prized asset, goodwill. While it is true that much has been done in certain directions, there has been no concerted centrally directed advertising campaign in America comparable with the campaign of the "B.C.G.A." Outlining the policy of the "B.C.G.A.," the writer points out that several basic principles are kept steadily in mind in all of the advertising matter used. Primarily the underlying policy is the broad-minded one of giving consumers the maximum service for their money. With the tremendous building activity which has already begun, and with the great potential wealth of the country and the susceptibility of the American people to advertising appeals, he feels that, by adopting a like course to that which has been pursued on this side, a most fertile field for the development of the gas business will be found to lie before the gas companies of America.

OBITUARY.

PROFESSOR A. G. VERNON HARCOURT.

Another of the prominent men whose names will be long connected with the gas industry died on Saturday at his residence, St. Clair, near Ryde, Isle of Wight.

Professor Augustus George Vernon Harcourt, M.A., F.R.S., who was appointed one of the three Metropolitan Gas Referees as long ago as 1872, had reached his eighty-fifth year, and had in his time occupied many responsible positions among the learned Societies, from the Royal Society downwards. He was elected to the Chemical Society in 1859, served as one of its Secretaries for eight years, and became President in 1895. In 1910 he was one of the five Past Presidents whose jubilee as Fellows was celebrated by the Society. In the British Association he early took an interest, and made many contributions to the Chemical Section, of which he was President in 1875. A few years later he was elected as one of the General Secretaries of the Association, an office he held for fourteen years. He was elected a Fellow of the Royal Society in 1868, and served on the Council, 1878 80. He was an Honorary Doctor of Oxford, M'Gill, and Durham Universities.

In applied chemistry, "The Times" points out, Professor Harcourt was chiefly drawn to questions dealing with the purification and testing of coal gas, he having been appointed one of the Referees whose duty it is to prescribe the mode of testing London gas and (subject to the various Acts of Parliament) to fix the limits of impurity allowed. One of his early researches on coal gas was his attempt to purify the gas from sulphur compounds by means which he devised for converting the carbon disulphide into hydrogen sulphide. "Harcourt's sulphur test" came into wide use; but its application on a large scale for the purification of coal gas has only recently been carried out successfully by Dr. Charles Carpenter at the South Metropolitan Gas-Works. Perhaps the most signal improvement in the testing of gas effected by Professor Harcourt was the introduction of the pentane lamp as the official standard of light, instead of the variable spermaceti candle. His original one-candle lamp has been replaced by the more convenient ten-candle pentane lamp; and this has been largely adopted as the measure of illuminating power, not only for gas, but for other illuminants.

PERSONAL.

At the recent meeting of the Provincial Grand Lodge of Cornwall, Mr. Samuel J. Ingram, the Engineer and Manager of the Truro Gas Company, had conferred upon him by Lord St. Leven, the R.W. Provincial Grand Master, the past-rank of Senior Grand Warden of the Province. It may also be noted that Mr. Ingram, who was last year elected a Director of the Camborne Gas Company, Ltd., has now been appointed by the Board as Managing-Director of the Company.

At last Wednesday's meeting of the Taunton Gas Company, the retirement of Mr. Alfred Edwards from, and the appointment of Mr. C. Harris to, the position of Manager and Secretary, were referred to. On his resignation, after fifty years' service, Mr. Edwards has been granted a pension of £250 per annum.

Manchester and District Junior Association.

Arrangements have been made for the members of this Association to visit the Liverpool Gas Company's works at Linacre on Saturday afternoon, the 6th prox. The Directors of the Liverpool Gas Company have invited the members to tea, after which an informal discussion on technical subjects will take place. The syllabus for the current session has now been arranged. It includes a visit on Wednesday, Oct. 8, to the Leyland Motor Works, when a paper will be read by Mr. W. H. Postlethwaite, of Salford, on "Efficiency of Boilers and Distribution." The only remaining fixture for this year is a visit on Saturday, Dec. 6, to the Southport Gas-Works. On Jan. 28 next year, there will be a visit to the Warrington works of Messrs. Fletcher, Russell, & Co., Ltd., when a paper will be read by Mr. I. H. Massey, of Oldham, on "Gas Appliances, Industrial and Domestic."

The Automobile Association have undertaken to provide a test which, it is stated, "shall be at once positive and conclusive, to prove once and for all that benzol of good quality is a most satisfactory motor fuel." Arrangements are being made for a road test of 10,000 miles on a moderate-sized touring car. The trial will be carried out under conditions which will preclude all possibility of criticism as to its genuineness and the finality of its results. The benzol used will be "N.B.A. Brand" of approved specification, manufactured by the members of the National Benzol Association; and samples will be taken constantly during the run for analysis by Dr. Harold G. Colman, who has acted during the war as referee on questions of benzol analysis for the Explosives Department of the Ministry of Munitions. Not only will samples of the fuel be analyzed, but the lubricating oil taken from the engine will also be submitted to Dr. Colman for his report. The details of the test are being settled by Captain R. H. Montgomery, the head of the Fuel Department of the Automobile Association, and Secretary of the Joint Fuels Committee.

VISIT TO PARIS AND THE BATTLE AREAS.

The Invitation by the Société Technique du Gaz.

Our colleagues of the Société Technique du Gaz en France have been able to complete the arrangements for the reception of Gas Associations of allied countries in October, and have issued a very cordial invitation to the members. The event will necessitate an early departure from London on Wednesday morning, Oct. 15, and London will again be reached on the night of Sunday, Oct. 19.

It will be seen from the circular issued by the Secretary of the Institution of Gas Engineers (Mr. Walter T. Dunn) that the Committee of the Société must receive at an early date the names of those who are able to accept the invitation, in order that arrangements may be completed—particularly in regard to hotel and automobile accommodation. A reply form has also to be filled in, and despatched to Messrs. Thomas Cook and Son, so as to reach them by Monday, Sept. 1. The cost will be £22 11s. 6d.; and the circular states explicitly what this sum includes.

The proposed itinerary is as follows:

Wednesday, Oct. 15.—Leave London (Victoria Station, S.E. & C. Railway) at 8.45 a.m. *vid* Folkestone and Boulogne. Arrive Paris at 6.30 p.m.

Thursday, Oct. 16.—Visit to Rheims and district. Leave Paris by train, *vid* the Marne Valley, Dormans, and Epernay for Rheims. After luncheon, proceed by automobile to Berry-au-Bac, passing through the scenes of desperate fighting throughout the war. On the return journey, the cars will drive through the streets of Rheims, viewing the Hotel de Ville, Place Royale, &c., to enable the members of the party to appreciate the damage done to the town. The Cathedral will be visited. The return to Paris will be made in time for dinner.

Friday, Oct. 17.—Visit places of interest in Paris. In the evening a banquet by invitation of the Société Technique de l'Industrie du Gaz en France will take place.

Saturday, Oct. 18.—Visit to Arras and district. Train will leave Paris for Longueau and *vid* Buire-sur-Ancre, Dernancourt and Albert, Ancre Valley, passing Aveluy Wood, and Achiet-le-Petit, for Arras. After luncheon, proceed by automobile for a circular tour, embracing Vimy Ridge, Lens, Souchez, &c., returning by rail to Paris for dinner.

Sunday, Oct. 19.—Leave Paris (Nord Station) 12 noon, *vid* Boulogne and Folkestone, arriving London (Victoria Station) at 9.5 p.m.

Given fine weather, combined with the courtesy and genial hospitality of our French hosts and friends (of which we have so many cherished memories), the programme promises days brimming over with interest. We feel sure that many will desire to take advantage of a unique opportunity of joining hands again with professional colleagues and allies, and of visiting under their guidance the ground and scenes of such momentous fighting and destruction, and places whose names will stand-out for all time with clearly defined boldness in the history of the Great War.

THE GREENWICH FUEL RESEARCH STATION.

A "Mystery" and its Solution.

The country is getting a bit tired of "mysteries," Government expenditure "scandals," national "white elephants," and so forth. A writer in the "Westminster Gazette" employs all these descriptions in an article which infers the possibility of the East Greenwich Research Station of the Fuel Research Board being enrolled in the list of administrative scandals. In the report of the Privy Council Committee on Scientific and Industrial Research dated August last year, there was mention that there had been much delay in the completion of the station through the scarcity of skilled labour and materials, and then much remained to be done in connection with the plant and apparatus. In another part of the report, hope was expressed that research work would be taken up by the close of the year. Another August has arrived; and now this criticism, which ought not to have been published in view of the reply to a question in the House of Commons a few days before. It was then stated that the expenditure on the research station up to date has been £130,924; and the estimate for it as at present planned was £193,588. Research work has been commenced. Then, who inspired the criticism? We have our suspicion; and we frankly say that it lies in the direction of the low-temperature carbonizing advocates. We will not specify any particular quarter. But there are among them those who want to try their luck on the lower-grade coals that are so frequently left unmined. These people hoped that the Board of Fuel Research would show how the economy of the country could be served by low-grade coal submitting itself to low-temperature carbonization. But they cannot wait for leisurely research; and so they intend to go forward "on their own," which is a very proper proceeding.

The last part of the article referred to in the foregoing paragraph is significant. The colliery owners, it says, "argue that the country's coal resources are so great that only the best and most valuable seams are worked. Lower-grade coal seams have not been worked to any extent; and, if this were done, these owners (who have, as the Midland Coal Products, Ltd, begun experi-

ments on a site in the Midlands) contend that it would give a new lease of life to our coalfields, and provide a solution of our coal problem. The whole of the capital of the Company has been put up by a committee of colliery owners and experts, who are confident that they can solve this problem." How the proposals of the Company to treat hitherto largely unworked low-grade coals will solve the coal problem is not explained. People will clamour for the best grades for other purposes just as much as ever.

"The Times" countered the "Westminster Gazette" article the following day. It pointed out that rapid progress is now being made with the completion of the works. The delay was principally due to important departures from the original plans of the building. The undertaking has been in hand for more than two years; and it is now expected that the plant will be so far complete by the middle of September as to enable operations to be begun. The plans were originally for a brick building carried on piling; this type of structure having been selected in agreement with Dr. Carpenter. At this stage, however, the Office of Works took over the responsibility for the erection; and, owing to the scarcity of bricks and stone, they stipulated for a steel building, which necessitated boring for the foundations. Had the first plans been proceeded with, it was estimated that the station would have been in operation within nine months. The boring drills, however, got driven below the permanent water-level, the water gained on them, and one part of the foundations alone took nearly a year to finish. It is stated that the central building is now being erected. The offices and laboratories are complete; and the gasholders are all ready. At first, it is said, experiments will be particularly directed to ascertain the maximum capacity of coal to yield motor spirit. It is not intended to deal at once with colliery refuse, but to confine experiments meanwhile to standard coal.

STATUTORY UNDERTAKINGS (TEMPORARY INCREASE OF CHARGES) ACT, 1918.

Latest List of Applications for, and Grants of, Orders.

Further applications have been made to the Board of Trade for Orders under the above-mentioned Act by the:

Dorking Gas Company,
Frome Gas Company,
Kenilworth Water Company, Limited,
Midsomer Norton Gas and Coke Company,
Newport (Mon.) Gas Company,
Oakham Water Company,
Queenstown Gas Company,
Hessle Gas Company,
Seaham Gas and Lighting Company,
Sutton District Water Company,
Syston and Thurmaston Gaslight and Coke Co., Ltd.,
Thirsk Gas Company,
Wetherby District Gas Company.

The Board of Trade have made Orders under the Act in favour of the:

Brixham Gas Company,
Brynmawr and Blaina Gas Company,
Dowlais Gas and Coke Company,
Liverpool Gas Company,
Mid-Kent Water Company,
Tynemouth Gas Company.

SEABORNE (DURHAM) COAL.

The National Gas Council and the Shipping Controller.

We have received from Mr. W. J. Smith, the Secretary of the National Gas Council, a copy of correspondence that has passed between the Council and the Shipping Controller, which shows that the Council are doing everything they possibly can to render assistance to the industry in this very serious matter.

In a letter dated the 16th inst. it is pointed out that since the deputation to the Shipping Controller on the 31st ult. steps have been taken to place evidence before the Controller of Coal Mines, proving that in certain districts household coal is being subsidized.

The following article appeared in the "Daily Telegraph" on the 8th inst.:

> "Coastal Traffic Decision.—An important decision has been reached in connection with the movement for the resuscitation of our coastwise traffic, which has diminished in volume to the extent of 50 p.ct. as compared with pre-war figures. At a conference yesterday between representatives of the Railway Executive Committee, the Ministry of Shipping, traders, and shipowners, the question of the diversion to the railways of traffic formerly carried coastwise by steamers was under discussion. As the result of the negotiations which have taken place, it has now been agreed that, from Aug. 18, the traffic which before the war ordinarily went by sea shall again be conveyed by coastwise steamers. The difficulty of the lower rates of carriage on the railways will be overcome by an arrangement which will not penalize traders, inasmuch as shippers will be repaid by the Government the difference in the cost between land and sea transport. The whole arrangement is of a purely temporary character, pending the establishment of the Transport Ministry and the raising of railway rates—an operation which necessarily will take some little time."

The Council immediately communicated with the Shipping Controller, asking him to confirm this statement; and the following is his reply:

> "I am desired by the Shipping Controller to acknowledge the receipt of your letter of 9th inst. with reference to coastal traffic. I am to say, in reply, that the extract quoted from the 'Daily Telegraph' is incomplete, in so far that the arrangements mentioned are only under consideration at present, and refer solely to traffic exported and imported to and from foreign countries, and are not intended to cover seaborne coal."

A further letter has now been addressed to the Shipping Controller, drawing attention to the remarks that he made at the deputation on the 31st of July, and asking him to say when there will be a likelihood of the present high freights being reduced.

The Council have also written at length on the whole matter to the Board of Trade. In addition to this, a representative of the Council interviewed officials at the Board of Trade pointing out the seriousness of the position, and the likelihood of its also being aggravated by demurrage charges. An official at the Board of Trade promised to take the matter in hand, and said he thought that, as soon as the Yorkshire pits were working again, the Coal Controller might be able to modify the order with regard to Durham seaborne coal in place of railborne.

In communicating with the Controller of Coal Mines, the Council referred to the case of the Edinburgh and Leith Corporations' successful claim for compensation for loss sustained by them through the diversion of a large quantity of their coal supply to Glasgow during May to October, 1918; and the Controller has replied that it would appear to be open to other gas undertakings to take similar action should they think fit to do so. This question will have to be carefully considered by the Central Executive Board at their meeting on the 9th of September, before advising the industry as to whether such action would be likely to have satisfactory results.

PENSIONS TO EX-SERVICE MEN.

Pre-War Wages Books should be Preserved.

The Superintendent of Publicity of the Ministry of Pensions asks us to circulate the text of a leaflet he has prepared, addressed

To Employers.

The Minister of Pensions desires to inform employers who previous to the outbreak of war had in their employment men who have since served in the Navy, Army, or Air Force, that they will render invaluable assistance by preserving carefully their wages books and similar records for the year preceding the 4th of August, 1914.

The amount of an alternative pension payable to a disabled man or to the widow of a sailor, soldier, or airman, who has lost his life in the war, depends upon proof of average earnings during that period.

If no records exist—and in the case of widows it is especially difficult in such circumstances to obtain reliable data as to the husband's pre-war earnings—delay in the award of an alternative pension and consequently hardship may ensue.

Great difficulty in verifying pre-war earnings has already been experienced owing to the destruction of wages books; and it will be intensified in future by the possible increase in the number of claims.

The Minister trusts that employers, when the importance of this matter has been brought to their notice, will readily give the necessary instructions; and thus, while contributing to the more efficient administration of pensions, help to safeguard the interests of the widows and disabled men.

Gas in the Dye Industry.

The field that is open to gas in the textile industry forms the subject of an article contributed by Mr. G. C. Shadwell to the pages of the Chicago "Gas Record." It has always seemed to him rather strange that next to nothing has ever appeared in the gas periodicals on the subject of the use of gas in dyeing. Finding it impossible to include in one article both dye manufacturers and dye utilization, he decided that the latter part of the subject deserved first treatment. However, apart from general recommendations, the industrial engineer is left to use his own discretion in selecting appliances and similar matters. Properly designed gas-heated vessels are ideal for containing the goods to be dyed, the colouring matters, and the water necessary for holding the latter in solution; and it is to be hoped that gas men will not be slow to take advantage of this fact. There is the more reason for introducing these appliances at the present time, because it would appear that there is no very definite standard in the sizes or styles of kettles used. For black and other dark colours, iron and copper are often employed; while for bright and light shades, block tin is preferable. Gas is particularly valuable where an exact regulation of heat is essential—that is where the temperature has to be gradually raised to a boil within a certain time, or when a given degree of the thermometer must not be exceeded. To ensure evenness, it is advisable to begin dyeing at a low temperature.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

The Programme for Next Week's Meeting.

There is to hand from Mr. Peter B. Watson, of Wishaw, the programme of the fifty-eighth annual meeting of the North British Association of Gas Managers, which will be held in Edinburgh, on Thursday, next week, under the presidency of Mr. William Wilson, of Burton-on-Trent, whence he removed from Falkirk subsequent to his election as "head" of the Scottish body.

After the transaction of the formal business, including the presentation of the Council's report and the statement of accounts, the President will read his address; and this will be followed by the "William Young Memorial Lecture," delivered by Mr. William Cranfield, of Nuneaton. There are no papers to be read.

Among the miscellaneous business to be brought under review by the meeting will be a report by a Sub-Committee of the Council dealing with the status and salaries of gas managers; also reports of the two Commercial Sections of the Association.

On the following day there will be an excursion by motor char-a-bancs to North Berwick, with a luncheon at the Royal Hotel.

Commercial Sections Reports.

That relating to the proceedings of the Western District (signed by Mr. David Fulton, of Helensburgh, Chairman) is as follows: The monthly meetings of the western district throughout the year have been most successful; the large attendances being the best possible tribute to the value of the work of the section. The January meeting was noteworthy for a record attendance; and the discussion on the steaming of horizontal and vertical retorts was most interesting and informative. Other subjects of special interest which have been discussed are: Sliding scale for prices of tar; superannuation; fuel rationing order; benzol production and sale; sulphate of ammonia corporation; and wages and conditions of labour. The visit to Uddingston Gas-Works proved very successful; and it is hoped to have many other similar visits to works of interest. The list of wages of gas-workers in the section's area has been of great service, and has been freely made use of by the members. The number of members is now 52—an increase of three on the previous year. Mr. James Dickson, of Johnstone, has presided over the meetings for a second term in a most able manner.

The Eastern District report (signed by Mr. R. S. Johnstone) reads: Continued and growing interest in the good work of the Commercial Section is evidenced by increased membership, and improved attendance at the several meetings held from time to time. The centres chosen this year for the meetings were Arbroath, Cupar, Dundee (two), and St. Andrews. The membership at present stands at 45—an increase or six over last year; and it is hoped that ere long most of the managers in the district will be included. The wide area of the district (from Fife to Inverness), together with indifferent travelling facilities, militates against large and frequent meetings. Nevertheless, the attendances hitherto have been most encouraging. It is earnestly hoped that with the return of peace, and more normal conditions, greater interest may be taken in the commercial side of the gas profession. Much helpful information has been obtained by free discussion on matters of vital interest. Great regret was felt at the loss of Mr. J. B. Scott, of Cowdenbeath, who was one of the originators of the section, and whose keen interest was maintained to the end. The Chairman for the present year is Mr. J. F. Black, of Newport, Fife.

More Patents in 1918.

The thirty-sixth report of the Comptroller-General of Patents, Designs, and Trade Marks was issued last week. It shows that there were 21,839 applications for patents last year, 10,019 for designs, and 6968 for trade marks. These figures compare respectively with 19,285, 13,208, and 5502 in 1917. The receipts from patents fees were £314,431 and from designs fees £5767—being decreases of £22,216 and £355 over the amounts for 1917. The total receipts were £345,405, as compared with £318,149 in 1917—an increase of £27,256. The surplus of receipts over expenditure was £135,890, compared with £124,427 in 1917. During the year 3451 trade marks were advertised and 3055 were registered.

The Haber Synthetic Ammonia Process.

It is understood, says "The Times," that one reason for the delay in the publication of the report of the Nitrogen Products Committee is the amount of work that has been necessary in the preparation of an index. This is believed to be now nearly complete; and the issue of the report is awaiting definite instructions from the Minister of Munitions. A representative of our daily contemporary was informed last week that the report, which is dated May last, deals at length with the project for installing a plant in Great Britain for the fixation of nitrogen from the atmosphere; and that it views as feasible the Haber, or synthetic ammonia, process. The utilization of water power for the purpose does not take a prominent place in the recommendations. The report is a final and not an interim one; but it is believed that it contemplates the resumption of investigations into both catalytic fixation and the use of nitrogen products in industry generally.

ELECTRICITY SUPPLY MEMORANDA.

The new Director of the Electrical Development Association (Mr. J. W. Beauchamp) has become very busy. We take it that it is his pen and brain that are now at work producing pamphlets.

Housing and Pertinent Questions.

What the sum of the output so far is we are not aware. But we know there has been one directed to drumming-up subscribers to the new organization; and now two others are available—one dealing with housing schemes and electricity supply, and the other with electrical problems associated with housing. The first of these two latter pamphlets gives plenty of evidence showing how conscious is the new Director of the difficulties with which electricity is encompassed in connection with the housing problem; and this probably accounts for the—confessedly we are only judging from the reviews—character of the components of the pamphlets which have a leaning to the vague and the abstract rather than to the transparent and the concrete. In considering this housing theme, the first question is who are the houses being designed for? This question and its answer have to be kept prominently in mind. If they are not, the architects and those responsible for the equipment of the houses may find that they have only made fools of themselves. They are not being designed for the wealthy; and this brings into view two points. The first is that equipment which increases considerably the cost of the dwelling will raise its rent (because capital and upkeep charges must be obtained from someone), and the other is that the most economical system of doing things in the house is the one that the tenants can best afford. Now we ask Mr. Beauchamp or any other honest electrician, Is electrical equipment for lighting, heating, and cooking, the cheapest system initially and in respect of upkeep? Can purposes be served and operations performed (as working people require them performed) cheaper by electricity than by any other agency? If both these questions can truthfully be answered in the affirmative, then electricity should go into the houses. An eye must be kept on the tenants' interests if satisfaction is to be given, and permanent custom assured.

Electricity's Point of View.

What the electricians are working for are not the interests of the tenants' pockets, but, by providing electrical equipment, the compulsory patronage of the tenants. This is a very dangerous course, as has been found in certain housing schemes of which there is knowledge. That, however, is the electrical line of action. We see in one of the pamphlets (quoting from the "Electrical Times") that "efforts should be made by the different branches [of the electricity industry] in co-operation to secure that every house is provided with electrical equipment where the public supply can be made available now, or is likely to become so in the near future." There is evidence in the pamphlet that expense should not be considered too narrowly, but that the matter should be looked at—from the householder's point of view? Not a bit of it; but from the point of view of the suppliers of electricity. Within the walls of these houses, we read, the next generation will grow up and be trained. There we have one of the outstanding attractions as seen by the electricians. But the great bulk of the present and the next generation will judge of electricity for all domestic purposes from the pocket point of view. This, with them, is a matter of compulsion. It is the opinion of the writer of the pamphlet that the authorities are more conscious of the difficulties which exist with regard to providing electrical equipment and electricity supply to their new colonies than of the immense benefits which the use of such supply would confer upon their prospective tenants and also the great economies in the maintenance of the properties which would result from its general use. But what are these "immense benefits"—categorically described—which could not be conferred equally well, we might with confidence venture to say "better," and certainly more economically, by gas? Even in illumination light of better quality—spectroscopically examined, or in relation to intrinsic brilliancy—can be offered by modern gas lighting; and this is highly important to the eyes not only of the next, but of the present generation.

Redecoration, Cubical Capacity, and General Assertions.

Then we do not want architects to work at the housing plans with cajolery at their elbows. There are suggestions here that electricity means the saving of redecoration work, and that a flameless illuminant will permit a reduction in the height of rooms. Wholesome houses are wanted for the working class; and (while modern gas lighting with modern gas is not the offender of the past) redecoration is necessary for sanitary reasons where rooms are used as in the working-class house. And where they are so used increased, and not reduced, cubical capacity is a desideratum; and a lowering of the ceilings would mean a reduction. Aerial supply lines and so forth are advocated. They would be more subject to damage than subterranean ones, and therefore to trouble with the service. May the community be protected against an enlargement of a sort of overhead spider's web! There is one thing that is sensible in the pamphlet. It is a clear indication that its author is not persuaded that the time is ripe for the introduction of cooking and

heating apparatus into workmen's houses. It is suggested that cable and service work should be provided of a character from which not only electric lighting can be supplied in the first instance, but which would enable the "advantages" of electric heating and cooking *at some future time*. This is an indication that heating and cooking are not considered to be universally applicable at once. We should like Mr. Beauchamp to give us a detailed defence of a final statement. It is that those who provide for the use of electricity—even if only to a limited extent at first, "are working for true economy, helping to make the workman's house an ideal home, and incidentally doing useful missionary work on behalf of the general use of electricity, which may take time to materialize, but yet becomes more effective in saving fuel and labour and improving the home conditions and comfort of the community than any other service or facility which can be placed at its disposal." There we have extravagance and caution mixed. If the economy and the superiority be true in all respects, then why should the application take time to materialize? Mr. Beauchamp knows, every electrical engineer knows, and we know. It is truly wonderful that electricity has had such a jump—even on paper—as the working man's friend, and that the working man himself has not yet found it out. There must be something wrong somewhere.

The Work of Installation.

The second pamphlet is more suggestive in regard to the methods of furnishing the supply; but it is not pretended that what is said is exhaustive, and it is certainly not dogmatic. Upon this congratulations should be given to Mr. Beauchamp for not treading in the footsteps of electricity publicity predecessors. The pamphlet states the situation in respect of pertinent considerations, looks for some developments, and asks for co-operation on the part of those who may discover something serviceable. It is all an indirect admission that there is much more to be done electrically; that finality has not yet been touched in the character of the work and of the plans for such electrical service as is in contemplation. It is thought that there is still room for the devising of methods of cheapening mains and service work, by pole, bracket, or direct attachment to the walls of the houses. What is good enough in this respect for the working man would not be good enough for Mr. Beauchamp or any of his supporters, and much less for the West-End. There is even talk of bare aerial lines and services. Heaven forbid! These above all things would be prone to corrosive attack. Of all places where the greatest security should be provided, is where there has not been the opportunity, owing to restricted educational facilities and environment, for developing the highest intelligence and care. As to internal wiring, it is considered by some that systems of surface wiring are good enough for the working man's home. We are not of this opinion. Mr. Beauchamp, however, entertains the double hope that the last word has not been said concerning cheaper forms of internal wiring, and that continued attention will be devoted to the subject, in order that there may be further development to that end. Any cheapening will have to be on present prices for labour and material; and we are afraid the time will not come again when even pre-war figures will be seen. Among the expenses attaching to electric lighting are the heavier ones necessitated by modern electric lamps. Their intrinsic brilliancy is of a ferocious order, and has to be kept within bounds. This means additional cost for modern glass refractors or reflectors; but the working-man householder will take courage and smile when he learns that the extra cost is generally justified by the results achieved. Provision in the houses is advocated for the accommodation of such "small fry" as flat irons, kettles, and apparatus of that kind. This, it is thought, will pave the way to greater demands for electricity for cooking and heating. The working-man householder has not an unlimited income; and we incline to think that the anticipations of the electricians are being pitched too high. "Meteor" of the "Electrical Times" says he doubts whether "the magnitude of the new field is realized except by our gas friends." The gas friends will make a note of the activities of the Electrical Development Association, while not overlooking the disadvantages under which the electricity industry is operating in this matter. One disadvantage that gas has is that so many electricity undertakings are municipally owned; and preference rather than maximum and economical service may decide the issue in some cases.

Travelling Accidents and Fatal Fires.

Our dear old friend the "Electrical Review" continues to exercise itself over the danger of using gas on trains, and to refer to "the terrible holocausts which will surely recur." It makes less fuss about the dangers of electricity; but the use of gas makes it literally shake with righteous indignation. It has not for some time had an opportunity of obtaining illustrations at home; but it has recently found one in India, and the source of its information is the "Pioneer." It was a bad accident, and many lives were lost. Several people were immediately killed; and the severity of the accident is shown by the reported statement that no less than 250 persons were so severely injured or pinned in by the wreckage that they lost their lives—some by burning. There were two engines concerned; and in one case the boiler became completely detached from the body. Evidently it did not occur to the "Pioneer" (and the "Review" probably did not wish to recognize the fact) that in this smashing of the engines there was sufficient cause for setting the wreckage on fire. It is said that "the large death roll was due to the rapidity with which the carriages caught fire owing to the gas cylinder bursting." Gas is not in the habit of igniting without there is a flame or fire already present; and, when a cylinder bursts with gas in it at high pressure, the gas does not linger about the spot, but naturally rapidly dissipates. Would it not be better if the "Review" applied a little commonsense and elementary science to these matters, instead of holding up its hands and elevating its eyebrows in pious horror. Gas is economical—and safe. Whether trains are run by steam or electricity—no matter whether they are lighted by gas or electricity—so long as combustible material for the construction of the carriages is used, there will be danger. In India, the railway carriages are no doubt in prime condition for a conflagration on the slightest provocation. We have read of terrible fires caused by electric traction; but we have never gone into hysterics over the use of electricity for traction purposes. We see there was a tramway accident last Saturday week near King's Cross, when two men were killed and eighteen injured. Through an electrical fusion, the car caught fire. Underneath the burning wreckage (the newspapers tell us) three pedestrians were pinned; and the body of one of the men who was killed was partially charred. On the same night another tramcar was set on fire at New Cross, owing to a collision, and the fusing of the electric wires.

SIXTY YEARS AGO.

[From the "Journal" for August, 1859.]

The Late Mr. Alexander Wright.—There are events which arrest the attention and cause the most thoughtless, as well as the most thinking, to reflect on the instability of everything mortal, and remind them that they are but sojourners upon earth. Such a one is that which has cut off the subject of this notice, at the premature age of 43, in the prime of life, in robust health, and in the flood-tide of that prosperity which his unwearied industry, his conciliating manners, his vigorous intellect, his unimpeached integrity, and his enlarged views had justly won for him. His loss leaves a blank in a large circle, the extent of which can only be appreciated by those who knew him as well, and respected him as sincerely, as the writer of these lines; and it is no disgrace to his brethren who survive him to say that the blank is one which will not easily be filled up. Alexander Wright was indeed an honour to his country and his profession. . . . Towards the latter end of June Mr. Wright sought relaxation from his labours by a journey in the North of Europe. He returned from Hamburg and on the following day was seized with an attack of Asiatic cholera in its most malignant form, to which he finally succumbed.

A Strike Fever.—The labouring classes employed in the building trades and in the manufacture of gas appear to be at present in a very alarming state of excitement, and on all hands we hear of strikes or of combinations which must inspire anxiety in the minds of every true well-wisher of the classes thus alluded to. Within the last fortnight the men employed by the Chartered Gas Company have successfully combined against their employers; and the men in the employ of the Imperial Company, stimulated by the success of their fellow craftsmen, have attempted to follow their example. It appears that the managers of the Imperial Company were, however, prepared for the event, and they had at their command such a supply of labour that, when the workmen of the company waited on them with their demands, they were enabled to dispense with their services entirely.

National Research Council of the United States.

The National Research Council was organized in the United States in 1916 (at the request of the President) by the National Academy of Sciences, as a measure of national preparedness; and the work accomplished by the Council in organizing research and in securing co-operation in the solution of military problems, is agreed to have demonstrated its capacity for larger service. Many of the investigations and researches which were not completed, too, gave so much promise for the future that the Council has since the war been re-organized to continue its work for the furtherance of science and its applications. The duties of the Council, as set forth in an Executive Order by the President of the United States, include: To stimulate research; to survey the larger possibilities of science, to formulate comprehensive projects of research, and to develop effective means of utilizing the scientific and technical resources of the country for dealing with these projects; to promote co-operation in research, both at home and abroad, in order to secure concentration of effort, minimize duplication, and stimulate progress, but in all co-operative undertakings to give encouragement to individual initiative, as fundamentally important to the advancement of science; to gather and collate scientific and technical information at home and abroad, in co-operation with Governmental and other agencies, and to render such information available to duly accredited persons.

The will of the late Sir Boverton Redwood, who died on June 4, has been proved. He left estate of the value of £165,013.

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THE STAFFORD GAS-WORKS EQUIPPED FOR NEW DEMANDS.

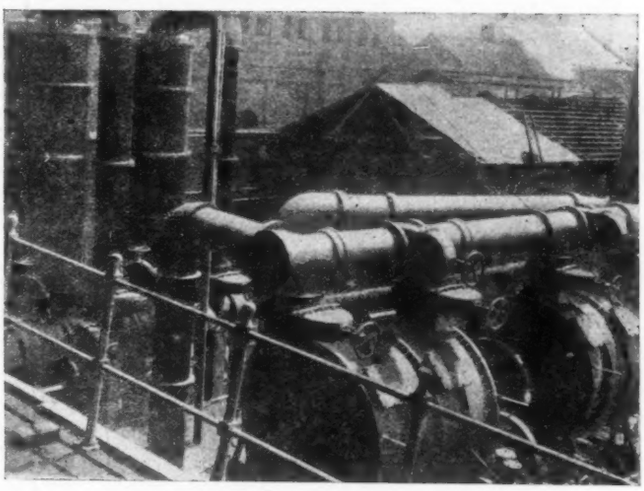
A Large Scheme Effecting Change in Plant and Processes.

(*Concluded from p.* 389.)

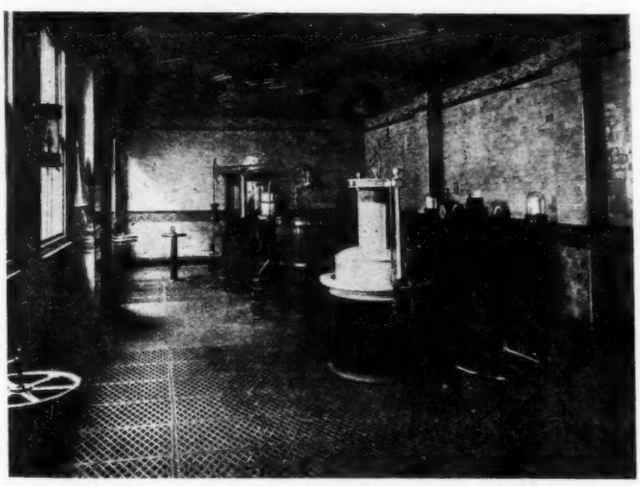
A Gas-Works Innovation—MacLaurin Centrifugal Washers.

Special interest is found in the washing plant. The Livesey washer (equal to 2 million cubic feet per day), made by Messrs. C. & W. Walker, Limited, and used for the double purpose of recovering the major portion of the tar fog in the gas and a small part of the ammonia, is first noticed. Then attention is directed to a Holmes rotary brush washer, which is divided into two sections, either of which can be worked independently or both together. This is also equal to 2 million cubic feet per day. During the war, half was used for benzol recovery. Its business to-day is to remove the final traces of ammonia, after the gas has been dealt with by two intermediate washers, which claim more particular consideration.

These washers are of the MacLaurin centrifugal type, and were erected by Messrs. Blair, Campbell, and M'Lean, of Glasgow. They are each of 2 million cubic feet capacity, and are the first introductions to gas-works practice. They have formerly been used in connection with coking plants; and, as a point of passing interest, it may be noted that they have been employed by Pears of soap fame for the extraction of alcohol from the atmosphere of certain rooms at their factory. The washers, the casing of which is of cast iron, contain five chambers through which passes a steel vertical shaft, on to which is keyed a series of cast-iron buckets (seven at Stafford); and between the buckets there are wrought-iron plates, with holes drilled through, and bossed-up. The water is led in, and sealed with an ordinary seal-pipe. It flows on to one of the plates, and then into the first cast-iron bucket, at the bottom of which a series of holes is drilled (say, nine in each bucket), and through these there is a piece of bass tied. With the shaft revolving at 200 R.P.M., the water is thrown against the side of the washer, and causes a very fine spray. This intermingles with the gas passing through the plate, and the ammonia is removed from the gas. The washer is very efficient. As worked at Stafford, it is calculated that the efficiency (to give a safe figure) is approximately 85 p.ct. If the cover is taken from the washer while the machine is in operation, and the water allowed to escape, it forms a circle some 100 ft. diameter. Seeing that the machine is only 5 ft. diameter, with such a force as this evidences, the spray inside must be a veritable cloud. These washers, which occupy a very small space indeed in relation to their capacity, also take out the last traces of tar; and they can also be used for the extraction of benzol and toluol. The testimony of Mr. Valon (as will have been gathered from what has already been said) is that the washers are performing their work very satisfactorily, and so have fully justified the enterprise of installing them as part of the works' system. The cost is relatively low; and each of the machines only requires 2½ H.P. for its operation.



THE WASHING PLANT AT STAFFORD.



GOVERNOR HOUSE AT THE STAFFORD GAS-WORKS.

A New Governor.

Passing the purifiers (which are again showing signs of subsidence, though built on piles, and which will undoubtedly have to be replaced by new and larger purifiers at an early date), and looking into the governor-house, a new 18-in. Braddock governor is noticed as a recent installation. This house, which has several attractive features, was described in the "Journal" for Nov. 3, 1903, when we also gave an account of the carburetted water-gas plant (500,000 c.ft. capacity) and the then new sulphate of ammonia plant. The only change in the water-gas plant that is noticed is a 50 H.P. "National" gas-engine, which has taken the place of a Westinghouse steam-engine; and a Keith-Blackman fan has also been introduced.

The Boiler Plant.

Glancing into the boiler-house, three boilers are seen. One is a Lancashire, 30 ft. by 8 ft. 6 in., fitted with Kogent bars. The other two are Galloway boilers, 28 ft. by 7 ft. 6 in.; one being fitted with Crossthwaite's patent furnace, and the other with ordinary bars and furnace. Mr. Valon has been keen to get the best fire-bars for burning-up the fine coke dust and the waste fuel made in the various parts of the works; and the Crossthwaite furnace is the one that has gained his approval. A thing which we have not before observed was noticed here. All the material from the vertical retort-furnaces is screened, and the combustible stuff is burned under the boilers. The large pieces mixed with the fine material open it; a better draught being thus obtained, and so a better fire.

The Benzol Plant—Loading and Unloading Liquids by Compressed Air.

Stafford, like most other gas-works, did its part in producing benzol during war time. The plant, it is observed, is of the Hird, Chamber, and Hammond type, and is now used for tar dehydration, having a capacity of 12 tons per twenty-four hours. In a sunk ferro-concrete tank (11 ft. in depth) are the benzolized and debenzolized oil-tanks. These are boiler-shells, 28 ft. by 7 ft. 6 in. It is of interest to hear that the foundations of the concrete tank and of the benzol plant were piled on Stewart's system of steel tubes, concrete filled—twelve piles being put under the concrete tank, and seven under the benzol plant. The walls of the concrete tank have been left sufficiently strong to carry stanchions for later on supporting overhead tar-storage tanks. A special feature about the benzol plant is that a Westinghouse brake compressor—a small thing, 3 ft. high by 8 in. diameter—is used for sending the benzol over to the tank-wagons by compressed air. The same system is used for unloading sulphuric acid.

Sulphate of Ammonia Plant—Excellent Results from the Neutral Process.

There is much of interest to be learned in connection with the sulphate of ammonia plant, which has been reconstructed. The plant is one of Messrs. C. & W. Walker's latest types, and has a capacity of 4 tons a day. A new Taylor saturator has been put in; this being of ¾-in. solid lead plate. Here work owing to subsidence has had to be undertaken. The stills got somewhat out of level. They had dropped about 1¾ in.; and it can be imagined what this means, and how the efficiency would be affected. However, the stills had to be levelled-up. The saturator has also been elevated above the ordinary ground floor. Previously, the floor had merely an earth bottom, with sheet-lead placed on top, and blue bricks on that. The result of this was that, with subsidence, the square corners of the bricks cut through the lead; and a lot of the mother liquor was wasted. In consequence of this misfortune, the earth has been taken out; and a platform carried on timbers has been made. Thus there are now two floors—one to carry the lead; and the other is the ordinary floor. With the

double floor, it is easy to ascertain whether any leakage is going on. In the case of the sulphate-store floor, exactly the same thing has been done.

When the plant was originally installed, the idea was to build the house sufficiently large for a duplicate set. It was, however, felt that more economical working would be obtained if larger stills were adopted; and so the new stills were put on the existing beds slightly extended. This somewhat affected the available space; but by a little rearrangement, there is plenty of room in the house for the comfortable carrying-on of the operations. Attention was directed to the pre-heater for waste gases. The original one was home-made out of some cast-iron circular plates. The new one is of Walker's make; and it is working very satisfactorily. The stills, too, it is seen, have been elevated by 15 in.; the reason being that, in connection with the liming chamber, lime sludge got emptied into the pit; and there was always disagreement among the men as to whose duty it was to clear it out. By elevating the stills 15 in., and running a pipe (controlled by a valve) to the settling-tanks outside, the pits are now kept clear. There is no cleaning-out to be done; and it is now altogether a much cleaner job. Another thing is that all the pumps have been assembled together, so there is not a long-run of steam-pipes; and the space over which the oil-can is carried is more limited than before. All these points make for economy and efficiency.

CARBURETTED WATER GAS PLANT.

In conjunction with the plant, it is noticed that a Broadbent 48-in. centrifugal drier has been installed.

There are not many works where precautions are taken for the retention of heat in the stills; and there is a lot of heat wasted. In this case, it is noticed that the stills are having applied an anti-thermic covering. As to the gases, these are passed through a home-made condenser—an 18-in. pipe with water trickling over the top. Two heap purifiers in concrete tanks are used. These are 18 ft. by 12 ft. by 18 in. deep. Formerly the purifiers were 3 ft. 6 in. deep; but the shallow ones were found much more efficient.

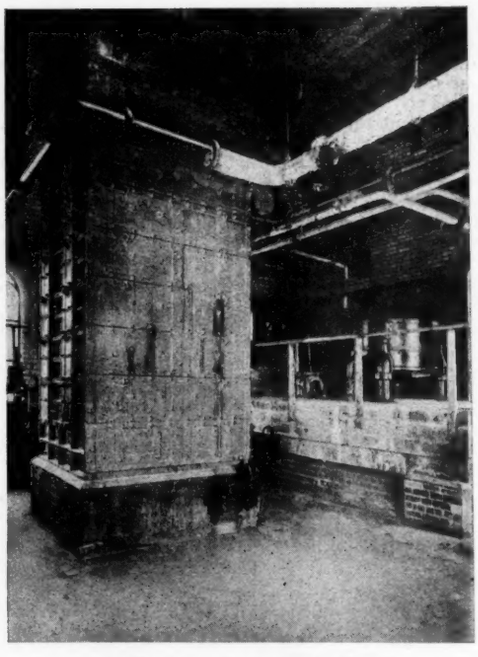
With regard to the quality of the sulphate, working is henceforth going to proceed under the South Metropolitan Gas Company's system, of which (as previously indicated) Mr. Valon is one of the patentees. The experience of other works is that, under this system, a high ammonia percentage sulphate is obtained, with low water content, and free acid *nil*. Here are the exact figures from one works: Ammonia, 25·65 p.ct.; moisture, 0·03 p.ct.; and free acid, *nil*. The nitrogen content is 29·1 p.ct. The cost of working the plant on a medium sized works is 4d. per ton. Messrs. C. & W. Walker are acting as agents in this particular business.

Description of the New Gasholder.

Separated by a road from the main part of the works is the site where formerly stood a rope-guided holder. The holder is no more. At present in use in the main works are two holders, one two-lift 60 ft. diameter, and 80,000 c.ft. capacity, and the other two-lift 106 ft. diameter, and 420,000 c.ft. capacity. On the site "across the way," a new three-lift holder and steel tank, 117 ft. diameter, is now being constructed by Messrs. C. & W. Walker, Ltd.; and when completed it will hold a million cubic feet of gas. It will be seen from the storage capacities mentioned above that the additional holder is badly needed for safety.

It was owing to difficulties of the ground and water, that selection was made of a steel tank erected above ground-level. The tank is 36 ft. deep, and will contain 10,000 tons of water. In the tank will be seven tiers of steel plates—the first or lowest tier being $\frac{7}{8}$ in. thickness, the second tier $\frac{3}{4}$ in., the third tier $\frac{11}{16}$ in., the fourth tier $\frac{1}{2}$ in., the fifth tier $\frac{3}{8}$ in., the sixth and top tiers $\frac{5}{16}$ in. thick, while the bottom plates of the tank are also $\frac{15}{16}$ in. thick. The first five vertical seams of side plates are butt-jointed with cover plates both inside and out, and are rivetted with $\frac{7}{8}$ in. down to $\frac{5}{8}$ in. rivets, and the top two rows of side plates are lap-jointed and double rivetted with $\frac{5}{8}$ in. rivets. The inner lift of the gasholder will be 110 ft. 3 in. diameter by 35 ft. deep; the middle lift, 112 ft. 6 in. by 35 ft. deep; and the outer lift, 114 ft. 9 in. by 35 ft. deep. The top crown of the holder will be dome-shaped, having a rise of 4 ft. 9 in. in the centre. It is supported by means of a steel-trussed roof, constructed of T-steel 4 in. by 4 in. by $\frac{1}{2}$ in. trussed with tension-rods $\frac{7}{8}$ in. diameter. Each lift of the holder has 28 vertical guides, the sizes being: Inner lift, 10 in. by 5 in. by 5 in. rolled steel joists; and middle and outer lifts, 8 in. by 3 in. steel channels. Each lift has 14 cast-iron rollers 15 in. diameter, mounted in strong steel carriages, for working in the channel guides in front of the holder standards.

The guide-framing of the holder will consist of fourteen lattice steel standards, 142 ft. 9 in. high from the bottom of the tank. These standards are 4 ft. 4 in. wide at the base, tapering to 1 ft. 6 in. at the top, and are constructed of two 10 in. by $3\frac{1}{2}$ in. by $3\frac{1}{2}$ in. by $\frac{3}{8}$ in. rolled steel channels with 3 in. by 3 in. by $\frac{3}{8}$ in. angle horizontal bracing and 3 in. $\frac{3}{8}$ in. flat diagonal lattice bars, and the rivets throughout the standards are $\frac{3}{4}$ in. diameter. The standards are connected together laterally with four tiers of lattice girders; each girder being 2 ft. deep. The top and bottom members are of 6 in. by $2\frac{1}{2}$ in. rolled steel channel, connected together by lattice bars $2\frac{1}{2}$ in. by $\frac{3}{8}$ in. flat steel, and the rivets throughout are of $\frac{3}{4}$ in. diameter. There will also be four tiers of steel diagonal bracings between the horizontal girders and standards, formed of rods varying from $1\frac{7}{8}$ in. to $1\frac{1}{8}$ in. diameter. The bracing of the tops of the standards together will be by wind-ties formed of 1 in. diameter steel rods.



SULPHATE OF AMMONIA PLANT.

Round the top of the tank will be a balcony, 2 ft. wide, formed of $\frac{1}{4}$-in. steel chequered plates; a steel ladder being provided for giving access to the balcony from the ground. The gas inlet and outlet pipes, which are built-up of steel plates in such a way as to form part of the general construction of the tank, have an area equal to 24 in. diameter.

Mr. Valon speaks very highly of the considerate treatment which Messrs. C. & W. Walker have exercised in connection with this holder contract, in respect of the advance of market values.

Paving the Works.

Before leaving the works, it may be mentioned that a commencement has been made with the paving of the roadways with stone setts. It is found that this is in the long run much cheaper than concrete or asphalte; the paving is durable, and is easily lifted when underground work has to be done. It also assists in maintaining cleanliness, which has a strong moral bearing upon work where workmen are concerned.

High-Pressure Distribution.

The demand for gas has undergone a vast change. It is more varied now than in times past. The incidence of peak loads is not what it used to be; and over the whole day gas has to be distributed at higher pressures than were the custom in days that are

growing more and more distant. Compression of gas has come largely to the relief of the suppliers, has enhanced advantage to the consumers, and has, in effect, brought by economical means outlying districts within the radius of the economy provided by reasonable concentration of manufacture at a suitable centre.

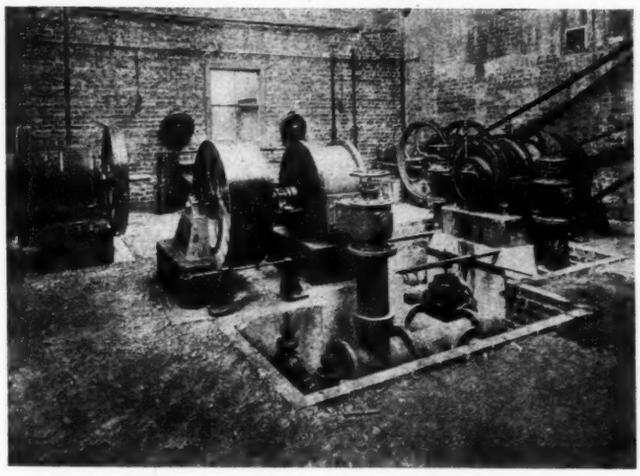
The use of compressors for transmitting gas to places beyond the urban limits has been in vogue for some years at the Stafford Gas-Works; but at first the compressors were electrically driven. They are not to-day. The two electric-motor driven compressors were only equal to 3000 c.ft. per hour each. These were for the supply of the village of Penkridge—some six miles distant. The small works at Penkridge were taken over by the Stafford Corporation in 1913; a 60,000 c.ft. holder was erected; and the works were dismantled. The gas was also sent two miles away and sold in bulk to the West Staffordshire Gas Company, who in turn supplied another village, three miles distant, known as Brewood, the privately owned works at which were also closed. Gas is sent to Penkridge from Stafford at a pressure of 80 inches, and thence along the Brewood line at holder pressure—about 4½ in.

To-day, the supply to Penkridge is being run in conjunction with the high-pressure system that has been found necessary in Stafford itself. Although there are about 300 gas-engines in the town, it is found that the greatest consumption is for cooking purposes on Sunday morning, when formerly the pressure in various parts of the town used to drop to somewhere about 12-10ths. For the whole of the high-pressure work, two Donkin gas-compressors are used; and with 7 and 5 inch steel mains distributing gas, through Reynolds governors, at five points, the pressure is maintained at the present time at 32-10ths. An examination of some of the old pressure-charts shows valleys down to 13-10ths, 16-10ths, and so forth. But at the present time, quite an even line is being maintained.

ONE MILLION CUBIC FEET GASHOLDER AND TANK.
(In Course of Erection.)

The new compressors are doing remarkably well; and as was shown in an early part of this article [p. 387], the cost of compression is cheaper with gas-engines than with electric-motors, though so much more work is being done. For operating the two 50,000 c.ft. compressors, two 20-H.P. "National" gas-engines, with countershaft drive are used—the object of the countershaft drive being that either engine or compressor can be used at will. The new compressors have only been at work about three months; and the old electric-motor driven ones are now kept as stand-bys.

While referring to district subjects, it might be mentioned that, for public lighting, the Patent Distant Lighting Company's system has been installed all through the district. This is a pressure wave system; and one point about it is that any desired number of lamps can be left alight when, at any hour, the remainder are extinguished.



THE HIGH-PRESSURE GAS-PLANT.

From the foregoing, it will be seen how well the Stafford Gas Department has been producing change upon the works not only to meet current demands, but to be prepared for any changes—either qualitative or quantitative—that may be effected in gas supply. Vertical retorts with steaming and a carburetted water-gas plant confer upon a gas-works an elasticity that will enable it to negotiate a very large range of conditions in production and supply. For the visit to the works, and the interesting details of which this article is composed, we are greatly indebted to Mr. Valon and his Chief Assistant, Mr. T. H. Poulson, of whose services in connection with the extensions and other changes, generous acknowledgment was made by his chief.

WATER GAS PRODUCTION IN HORIZONTAL RETORTS.

The "Journal für Gasbeleuchtung," Vol. LXII., pp. 253-61 contains a lengthy article on this subject by Herr E. Goffin. It is abstracted in the current issue of the "Journal of the Society of Chemical Industry."

Particulars are given of the installation of five new settings of horizontal retorts erected at the Heddernheim Gas-Works of the Municipality of Frankfort, whereby the output of gas was increased from 10,500 to 20,200 cb.m. per twenty-four hours, with very little disturbance of the previously existing installations. The retorts could be steamed; and for this purpose, a volume of 3·5 cb.m. of water per twenty-four hours was employed. The area of the heated surface of the boiler was 12·50 sq.m.; and the steam was generated at 0·5 atmosphere excess pressure. The retorts were fully charged with from 420 to 450 kilos. of Saar coal; and the production of water-gas was continued over a period of 9½ hours. The electric power employed per ton of coal in charging and discharging was about 0·3 KW. per hour. The yield of gas due to the steaming was 52·8 cb.m. (at 15°C. and 760 mm. pressure), of a gross calorific value 4600 calories per cubic metre per 100 kilos. of coal. Steaming does not affect the life of a setting; for no repairs are necessary to the first setting steamed over a period of 1200 working days. There is very little retort carbon; and this is removed about two or three times per annum. The yield of ammonia is considerably increased; and the yield of tar is from 5 to 6 kilos. per 100 kilos. of coal gasified. The tar is very fluid. It is composed of about 1·5 p.ct. of water, 3·7 p.ct. of light oil, 22·1 p.ct. of middle and heavy oil, 16·4 p.ct. of anthracene oil, with 56·3 p.ct. of pitch (melting point 58° C.).

Results obtained by E. Terres, operating the retorts with and without steaming respectively, are detailed. Without steaming, the coal was heated for 8½ hours on the first day and for 8 hours on each of two subsequent days. In the steaming experiments, the coal was heated for 10 hours on the first day, and for 9½ hours on each of three subsequent days. These periods included 7 hours' steaming on the first day, 4 hours on the second, 6 hours on the third, and 7½ hours on the fourth. The coal employed in the steaming experiments (air-dried) contained 1·28 p.ct. of water, 7·99 p.ct. of ash, and 90·73 p.ct. of combustible matter; while that employed in the experiments without steaming contained water 1·40 p.ct., ash 8·48 p.ct., and combustible matter 90·12 p.ct. The calorific value of the coal was 7200 calories per kilo. With steaming, the average composition of the gas was 5 p.ct. of carbon dioxide, 2·6 p.ct. of heavy hydrocarbons, 10 p.ct. of carbon monoxide, 51·2 p.ct. of hydrogen, 25·6 p.ct. of methane, and 5·6 p.ct. of nitrogen. Without steaming, it contained 3·2 p.ct. of carbon dioxide, 3·7 p.ct. of heavy hydrocarbons, 8·3 p.ct. of carbon monoxide, 48·6 p.ct. of hydrogen, 31·0 p.ct. of methane, and 5·2 p.ct. of nitrogen. With steaming, the yield of gas (measured throughout at 15°C. and 760 mm. pressure) per setting per twenty-four hours was 4156 cb.m. and per retort per twenty-four hours 472 cb.m. The yield of gas was 48·35 cb.m. per 100 kilos. of air-dried coal. The yield of coke was 66·20 p.ct. The coke used for firing amounted to 16·29 kilos. per 100 kilos. of raw coal. The specific gravity of the gas was ·519; its gross calorific value, 4642 calories. Without steaming, the results obtained were: Yield of gas per setting per twenty-four hours 3610 cb.m.; and per retort per twenty-four hours, 401 cb.m. The gas yield was 33·71 cb.m. per 100 kilos. of dried coal; and the yield of coke, 68·45 p.ct. The coke used for firing amounted to 10·22 kilos. per 100 kilos. of raw coal. The specific gravity of the gas was ·490; its gross calorific value, 5605 calories.

GAS-WORKS POWER PLANTS.

JUDICIOUS MODERNIZATION.

By H. C. WIDLAKE, A.M.I.E.E.

Plymouth and Stonehouse Gaslight and Coke Company.

(*Continued from p.* 391.)

LARGE PUMPS.

SMALL steam pumps, particularly when used for heavy duty, take a lot of looking after; and when it becomes possible to scrap them in favour of belt-driven ram-pumps, the capital outlay is so comparatively slight as to be not worth considering in the light of a reason against the proposed change. When, however, we come to deal with the case of large pumps, it is worth while making some serious attempt to convert them for electrical operation, particularly where the pump is in good condition, or where the connections are of such a special nature as to render it a very difficult task to instal a new, and hence an entirely different, type of pump. It is often in such cases that old and new meet, and form a perfectly satisfactory job.

Fig. 5 shows an old type of ram pump adapted for electric driving in a very inexpensive manner. In this case, it will be noticed that the piston rod has been left in the steam-cylinder in order to serve the purpose of a guide—the piston itself having been withdrawn from the cylinder and the valve rod removed. It sometimes happens in conversions of this sort that the width of the existing steam-engine flywheel is not sufficient to accommodate a belt of width enough to transmit the necessary driving power; and where this is found to be the case, the best course is to fit a split pulley, having the necessary width of face, on the shaft beside the flywheel. It must be noted that in all cases where the crank-shaft of an existing steam-engine is used in connection with a new motor drive, the connecting rod, or the piston itself, should be removed, together with the valve rod, in order to prevent compression taking place in the cylinder.

In the cases that we have already dealt with, it has been a comparatively simple matter to so instal an electric motor as to work some form of rotary mechanism at a predetermined speed. When, however, we come to consider the case of (say) a large steam direct-driven pump with a view to driving it by means of an electric motor, it seems at first sight a hopeless task to attempt to drive it from a rotary source of power, owing to the absence of any rotating element in the pump. Very often, in view of the age of such plant, it is felt that the best course would be to throw the thing out—lock, stock, and barrel—and instal in its place a modern motor-driven job. Against this, however, we have to consider the high prices ruling, the difficulty of getting delivery, and also the amount of work which the installation of a modern type pump would in all probability necessitate in regard to the suction and delivery arrangements. In the case of a large and expensive pump which is known to be in good condition throughout, and to be consequently worth spending a little money upon, there is a very simple and reliable method of arranging a motor drive which is fully illustrated in fig. 6.

From this it will be seen that the general idea is to use the steam-cylinder of the pump as a crosshead guide; and with this purpose in view the steam piston, steam cylinder cover, and all the valve gear have been removed. Upon the end of the piston rod originally occupied by the steam piston, a piston type of guide is fitted, somewhat similar to the piston of an internal combustion engine, inasmuch as it is fitted with a gudgeon pin for the attachment of a connecting rod. It has, however, no compression rings or groves, and is turned to a sliding fit in the cylinder.

It may be mentioned that, in the case of a small pump converted some time ago by the writer, the piston and crankshaft of an old De Dion-Bouton single cylindered car engine was employed with perfect success. A connecting rod is taken from the gudgeon pin and connected to a crank mounted on a channel framework, upon which the steam end of the pump also rests, as shown in the sketch. This connecting rod should be of sufficient length, having regard to the diameter of the crank pin circle, to minimize any side-thrust upon the walls of the steam-cylinder, or rather the crosshead guide (as it becomes under the new arrangement). In the sketch shown, an electric motor is installed for the purpose of driving the pump; and in order to break down the speed of the motor to the number of strokes per minute required at the pump, it will be seen that a second motion shaft is used, which is coupled by belt to the motor pulley and drives the crankshaft through spur reduction gear. If, however, it is desired to drive the pump from an adjacent slow-speed line-shaft, the second motion shaft can be dispensed with. The writer has under his care a pump which was altered in this manner two years ago, and it has never given a moment's trouble. It is essential, however, that the body of the pump should be rigidly associated with the channel framing on which the driving crank is installed, and, further, that the pump should be provided with an adequate air-vessel on the delivery side.

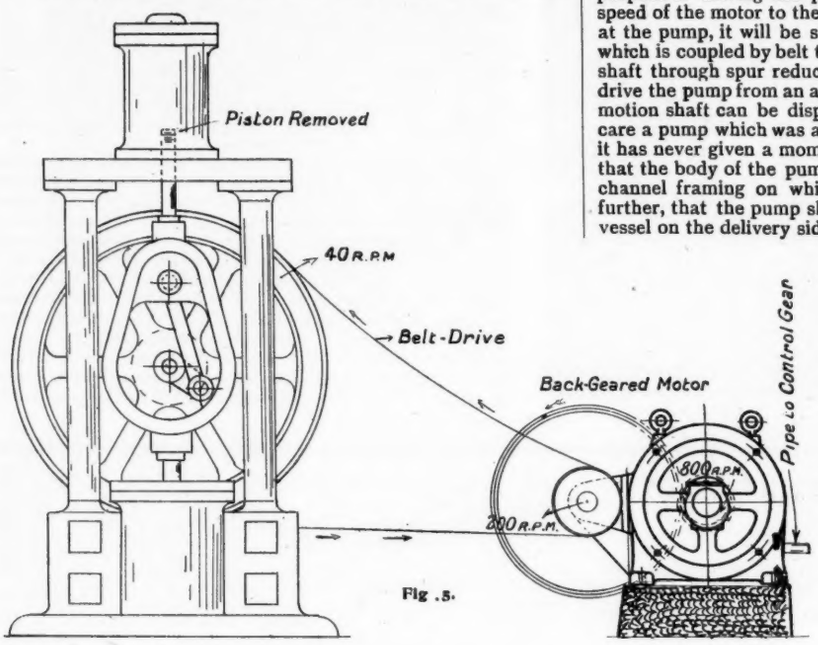


Fig. 5.

AN INTERESTING CONVERSION.

As illustrating the success with which judicious modernization may be attended, the writer proposes to describe a particularly interesting job carried out by him about twelve months ago in connection with an installation of water-gas plant exhausters. Reference has already been made to certain previous contributions dealing with this subject, in which were outlined the conditions which a generating plant should necessarily fulfil before it could safely be entrusted with the task of driving exhausters. In this particular case, however, the fulfilment of these conditions was not considered to be essential to the success of the proposed alteration, inasmuch as the exhausters concerned were operated in conjunction with a relief holder of such capacity as rendered the literally continuous running of the exhausters unnecessary—that is, no harm could be done if the exhausters stopped for a few minutes owing (say) to the blowing of a fuse or the falling of a feeder circuit-breaker.

(*To be continued.*)

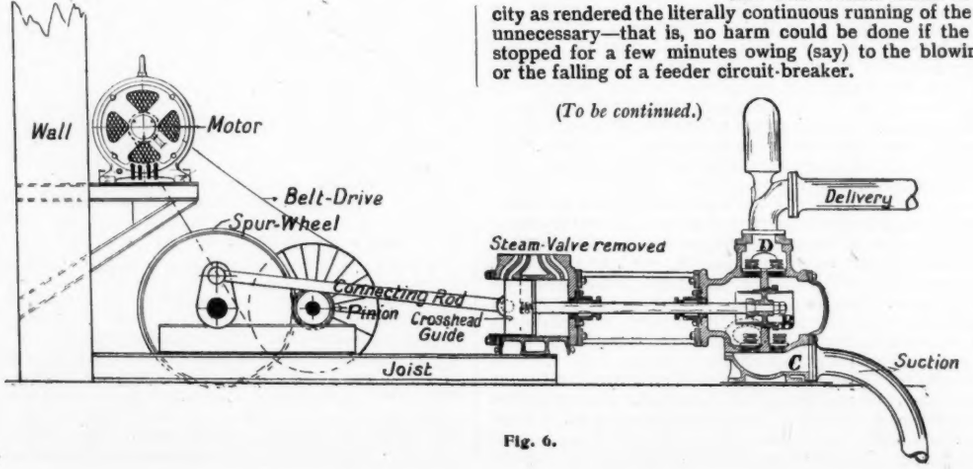


Fig. 6.

BENZOL DETRACTORS.

By Capt. E. DE NORMANVILLE, R.E.,

Technical Adviser to the National Benzol Association.

THE growth of the benzol movement in Britain has suffered a series of set-backs to its popularity, which everyone concerned should endeavour to eradicate. At the present time, it is suffering from two troubles. In the first place, there are still some few firms putting benzol on the market for motor-car use which is inferior in quality to the standard specification of the National Benzol Association. In the second place, articles and letters appear in the lay Press from time to time alleging this, that, and the other trouble from the use of benzol as a motor spirit. It is necessary therefore to clear these points up, and people interested in the expansion of the industry, and all that it portends for the national benefit, should bestir themselves to contradict erroneous impressions raised in such a manner.

To deal, first, with the question of the inferior quality benzol put on the market for motor spirit, there can only be two governing causes. Either the purveyors in question are ignorant, or else they are mischievous. There is no doubt that in pre-National Benzol Association days, the movement suffered very severely from this trouble. It was then possible to hope that the people who placed unsuitable quality benzol on the market did so in ignorance of the damage they would do to their fellow producers who sold a high-grade spirit. Now, however, when the standard specification has been so widely distributed and published, it is difficult to see how ignorance can be the controlling factor. One is therefore forced reluctantly to the belief that such people act maliciously. It may be a touch of the all-prevailing malady "Profiteeringitis," under which system a small saving in rectification costs per gallon is effected at the expense of the user. There is also the possibility that certain interests in the oil world would not be too careful to stop the sale of unsuitable benzol, which would have the effect of detracting from its popularity.

THE QUESTION OF QUALITY.

It must be remembered that benzol for use in an internal combustion engine must conform, at a minimum, to the National Benzol Association standard specification if good results are to be obtained. In preparing the specification, the Association had gone to the fullest elasticity practicable, so as to cause the minimum difficulty to producers. It is, however, no use hiding the fact that inferior quality benzol will cause trouble when used in the engine of a motor-car. This is a plain fact; and there is nothing more certain than that all the difficulties and troubles recorded from time to time in the Press are due solely to the use of inferior quality benzol. They are not due to the use of benzol *per se*. It is necessary to drum this fact into the public mind, so as to ensure the demand for benzol up to the Association's standard. The public must be trained to insist on this until the necessary time has elapsed for the Association adequately to control the quality put on the market.

In this connection, a full column article appeared recently in the "Pall Mall Gazette," entitled "Comments of a Motorist—. Does Benzol cause Corrosion?" It was written by Mr. W. E Humphreys; and I am quite sure that the writer had no intention of damaging the interests of the home produced fuel movement. None the less, the fact remains that the comments, as given, would have the effect of frightening the potential user of the British spirit.

If the query at the top of the article had read "Does Bad Benzol Cause Corrosion?" it would have been a legitimate subject for discussion; and the answer would be in the affirmative. When, however, there is no qualifying adjective employed, the public naturally assume the query to refer to the accepted standard of benzol. It is in this way that, all unwittingly, damage is done to the movement.

A SERIES OF TROUBLES.

The article then proceeds to refer to a series of troubles in regard to the use of benzol—still, unfortunately, without any qualification. With one exception none of the troubles alluded to could conceivably have occurred with the use of proper grade spirit. The exception is in relation to a choked jet. Benzol is certainly a stronger solvent than petrol; and if there is any paint at the tank joints, or any rubber connection, either of which factors would be innocuous with petrol, small particles would be likely to get detached and cause trouble by choking the jet. A number of the cans and drums at present in use for the distribution of motor spirit are far from being in the condition which they ought to be in. The article also refers to the possibility of acid fumes causing direct corrosion. Clause 7 of the standard specification was evidently quite out of mind. It reads as follows: "Benzol shall be entirely free from acids, alkalis, and sulphuretted hydrogen."

The article concludes with a plea for the necessity of research work; and here, again, it may be assumed that the intention of the writer was excellent. So far, however, as the use of proper benzol is concerned, there is no need for research. What is wanted is to discover, with the minimum expenditure of time, the method by which inferior quality spirit may be kept off the market for internal combustion engine use.

As a corollary to the comments above, relative to the use of inferior quality tins for distributing benzol (this defect should be purely temporary), it is certainly advisable to recommend the use of a first-rate filter through which to pour the spirit into the tank. An excellent and very simple filter can be made at home, or will be produced by a local garage for a nominal sum. Insert a layer of clean cotton wool between two sheets of fine gauze, which will effectively trap any particle of paint or similar impurity. Again, it must be remembered that rubber tubing, though rarely used in connection with petrol piping, must never be used with benzol. Again, if any trouble should be encountered in regard to the choking of the jet, the tank should be filled with benzol and left to stand, and then thoroughly rinsed out. The benzol can be filtered and replaced. As a general rule, this simple precaution overcomes the difficulty.

INDUSTRIAL LIGHTING INSTALLATIONS.

Last February there was presented at a Joint Meeting of the Section of Physics and Chemistry of the Illuminating Engineering Society of the United States a paper by Mr. C. E. Clewell, the Assistant Professor of Electrical Engineering in the University of Pennsylvania, dealing exhaustively with the subject of industrial lighting.

Mr. Clewell introduces his paper by saying: "If every working man in the industries of this country lost each day one minute per eight-hour day, due to inadequate working facilities, the economic loss to the country, based on certain statistics, might approximately be set down as equal to $10,000,000 per annum. Similarly, a loss of one hour per day by the total employees in all industries would mean roughly a loss well on toward a half-billion dollars per annum. These figures are based on the estimated wages in this country per annum as reduced to the total wages per minute or per hour; these factors then being employed as a basis for the determination of the losses just mentioned. Reference will be made later to losses due to poor light and, conversely, to gains made possible by highly adequate light; and when the loss of a minute or an hour per day due to poor light is mentioned, while it may seem trivial in itself, its importance to the industrial economy of the country will be more evident from the foregoing general figures, while its relatively large magnitude when compared to the costs of the best lighting will appear subsequently."

INTENSITIES OF ARTIFICIAL LIGHTING.

Three principal points stand out in the design of any factory lighting system—namely, (1) the quantity of the illumination to use for given classes of work, (2) the proper distribution of the light, and (3) the avoidance of glare. These points, without regard to other items which must often also be taken into account, are fundamental to the success of the average system. Although the quantity of light is often popularly looked upon as the item of greatest importance, at the present time the avoidance of glare may be taken as probably more vital to the interests of eyesight than either of the other items just mentioned. This statement is based upon the unusual neglect of factory owners to employ shielding devices—such as reflectors or shades—with the brilliant lamps now so commonly used. It may be noted, however, that while the use of reflectors is practically fundamental to the avoidance of glare, the use of reflectors also bears very closely upon the other two factors of quantity and of distribution of light.

It is well to note that a comparison between natural and artificial lighting indicates that the ordinary intensities of natural light are far in excess of those which can economically be looked for, or which are even necessary with artificial lighting. The eye possesses a marked degree of flexibility in the illumination intensities with which vision is possible and comfortable. A simple test of this is to read a newspaper in the elevated or subway surface cars just before entering the subway from daylight conditions, and to note that little effort is required to continue reading comfortably under the electric car lamps, though the intensity of the artificial light may be very small in comparison with the intensity of the previous daylight. Another impression may be gained of these large differences by noting that interior intensities of 50 or more foot-candles are common near windows by day, whereas at night reading may be done comfortably with artificial lighting intensities of (say) two or three foot-candles—that is to say, only 5 p.ct. of the foregoing daylight value. This means that, due to the peculiar adaptability of the eye to lower intensities of artificial illumination at night, it is not necessary to provide nearly as high intensities with an artificial lighting system as would at first be supposed, based merely upon what might be termed daylight standards. When artificial light is required to supplement inadequate daylight, however, then it becomes more important to consider higher intensities of the artificial illumination because of its direct competition under such circumstances with daylight values.

INTENSITY STANDARDS.

The whole question of intensity values to employ for any given demands upon vision—such as those imposed by various classes of work or different degrees of refinement in the discrimination of detail in the objects looked at—is one which does not yet seem to have been conclusively demonstrated. Illuminating engineers—in fact, practically anyone who is called upon to decide how much light to furnish for given working operations—usually depend upon their judgment, which is often based upon conditions which have

seemed satisfactory in other similar locations. This scheme is safe as far as it goes; but it is very difficult to tell when a given system is satisfactory from every standpoint of vision. I have seen a lighting system installed which was far superior to the older system that it superseded, but which was, at the same time, inferior to a still better system that was later proposed. Here the employees thought the second improved system was very satisfactory because of its comparison with a very much inferior system. The judgment of the employees here, if taken on a basis of what was considered satisfactory, might have been materially different from what it would have been if they were asked for an opinion under a still more nearly ideal arrangement of lamps.

I feel strongly that the specification of the proper quantity of illumination to use for varying visual demands is a matter which is far from solved, and that probably the only way in which it could ever be solved positively would be to take ophthalmological observations upon given observers under a given class of work for different degrees of illumination intensity, and over sufficiently long periods to take into account the effects of the illumination upon permanent depression of the eyesight. Temporary judgments based on casual observations do not take into account this factor of long-continued use of the light; and hence they lack at least one element involved. The excellent work of Ferree and Rand, at Bryn Mawr College, has given to the lighting art a good deal of useful information along this general direction.

Safety Standards of Intensity.

There is another side of intensity specifications, however, which can be approached with somewhat more confidence, and that is the matter of providing enough light to safeguard employees against accidents and to specify minimum values below which manufacture cannot well be conducted without likelihood of time losses and inaccuracies in workmanship. The codes now in force in several of the States (based on the code prepared by the Committee on Lighting Legislation of the Illuminating Engineering Society) have included specifications on this minimum basis, and then usually add for each class of work a higher value, which is headed as a "desirable" intensity.

In the preparation of tables of suitable intensities of illumination for all classes of work, and for the various ramifications of manufacture, two difficulties present themselves—one being lack of information on just what the illumination requirements are for these almost infinite operations, with their varying shades of form, colour, and detail; the second being the cumbersome extent of such a list which would endeavour to cover all cases. In the original code of the Illuminating Engineering Society, all industrial processes were summarized under the four heads: (*a*) Storage, passageways, stairways, and the like; (*b*) rough manufacturing and other operations; (*c*) fine manufacturing and other operations; and (*d*) special cases of fine work. Later, these lists of classification groups have been elaborated somewhat, although the Illuminating Engineering Society's code has been based on this general scheme of classification through its revisions, with the addition of several groups. There is a tendency in one and another of the State codes to amplify the lists of operations and to specify intensities for a larger number of detailed cases.

Distribution and Glare.

The question of how the light should be distributed over a factory floor area is one which must be determined by the density of the work and how near an approach may be desired towards a perfectly uniform condition throughout the entire floor-space. Reflectors perform an important function in the correct distribution of light from lamps, which, by themselves, might not result in nearly so satisfactory a lighting system.

The avoidance of glare is of the utmost importance, and has already been touched upon. In its simplest form, the avoidance of glare is approached by the workman when he surrounds his otherwise bare local lamp with a piece of paper, or hangs up a piece of cardboard in front of the lamp so as to prevent the strong light of the lamp from shining directly into the eyes. From several standpoints, the proper attention to this feature in the lighting system is one of the most important items of all; and one authority has gone so far as to say, in effect, that if no other improvements were made in existing systems of factory lighting than the equipment of each lamp with a suitable reflector so as to cut off from the eyes all direct rays from the brilliant filaments, considerable improvement would probably be made in the reduction of industrial accidents. Obviously, the reduction of eye-strain and the improved workmanship which such a course would promote would also be decided advantages.

Maintenance of the System.

The effects of light-coloured surfaces for walls, ceilings, and columns have long been recognized as a factor in the effectiveness of lighting conditions, both natural and artificial. White or light-tinted paints and frequent cleaning are two factors to consider. No lighting system can maintain its original effectiveness unless the lamps and reflectors are cleaned at proper intervals and unless burned-out lamps are renewed promptly. This is of such fundamental importance to the continued success of any lighting system that some space might well be devoted to the importance of maintenance and to methods for conducting such work, in preliminary reports submitted to building owners on proposed lighting systems. Lamp and reflector cleaning are items which are so readily overlooked that the average user of light requires education along this line if his appreciation of the needs of the case is to result in systematic adherence to the work. One of the best plans I have ever seen of this kind is that adopted some years ago at the East Pittsburgh works of the Westinghouse Electric and Manufacturing Company, where the maintenance of the very large lighting system is conducted by a special division of the electrical department. Here, the original plans of the works included the systematic inspection of all lamps each day for the purpose of locating every burned-out lamp and for noting equipment in need of cleaning. On the basis of these daily inspection reports, the maintenance work may be conducted effectively, and a record can be kept of the costs for such work which forms an interesting basis for a comparison between the costs of the maintenance work and the gains produced by the higher standard of illumination thus secured.

State Regulations.

The original code of factory lighting issued several years ago by the Illuminating Engineering Society has since been used as the basis for State regulations in Pennsylvania, New Jersey, Ohio, New York, and Wisconsin. Furthermore, the Committee on Labour of the Advisory Council for National Defence issued through its Divisional Committee on Lighting a code based largely on that of the Illuminating Engineering Society. Many of these codes contain modifications in the general arrangements or in the addition of explanatory matter not found in the original Illuminating Engineering Society's code; but the three fundamental items of intensity, distribution, and the absence of glare form, for the most part, an important place in all regulations.

The issuance of the State codes has, of course, been based on the safeguarding of employees, and they have sought to reduce accidents, and to prevent premature eye trouble by the stipulation of safe methods and amounts of illumination for various factory operations. In one of the recent State codes, the factor of conserving time by permitting employees to do more and better work, without additional effort, in a given time, through the medium of better light, was emphasized as a factor which might influence the wealth of the State.

Where intensity of illumination is specified, as in these relatively new codes, the need of a simple device for the measurement of illumination by relatively inexperienced people has been keenly felt. The appearance of a small and very convenient foot-candle-meter (as a result of the work of Dr. C. H. Sharp, of New York City) has, in a way, met this need; and it is, I believe, employed to a limited extent by the Departments of Labour in Pennsylvania and New Jersey.

Problems Added by the War.

While the stress of war conditions is now largely over, it is interesting to review, in conclusion, a few of the things which affected lighting practice due to these unusual conditions. One of them, of course, was that of protective lighting about industrial plants as a safeguard against damage to the plant; and this type of illumination received a good deal of attention and was employed very effectively in many cases. Another was that of lighting curtailment, as one of the points taken up by the Federal Fuel Administration; and here, as previously stated, it was found that of all the divisions of lighting, the industries were the one field in which increases rather than curtailment of lighting were desirable—thus emphasizing the importance with which the problem of industrial lighting was viewed during the war as a strictly war problem.

The emphasis which was placed upon good light by the Employment Management Division of the War Industries Board in its efforts to educate employment managers under the intensified training scheme then in vogue, and the hope which was entertained that a high standard of working environment—that is to say, good light, fresh air, adequate heat, cleanliness, and neatness about the plant, and the like—would all go to prevent the excessive turnover of labour in the war industries during the progress of the war, all go to demonstrate the important place which industrial lighting holds in the industrial field.

The foregoing notes, the author said, in conclusion, while not in any sense a scientific analysis of factory lighting from the quantitative side, have given a genuine outline of the factors involved in the problem. With these in mind and thoroughly accepted and appreciated, the actual detailed planning for industrial lighting systems possesses the possibility of an interesting field for study, and certainly contains an element of compensation for those who devote time to such work, through the beneficial effects which good lighting may accomplish for those whose vision and whose workmanship depend to such an extent upon facilities of this general nature.

Bye-Product Coke-Ovens Fired with Producer Gas.

According to "Iron Age" [New York] for May 22, a new coke plant has recently been put into operation at the Providence, R.I., Gaslight Company's works, where the ovens, forty in number, are fired with producer gas in order to release the entire output of gas for other purposes. By this means a yield of more than 11,000 c.ft. of coal gas per ton of coal carbonized is secured. The installation is interesting as suggesting to the iron and steel industry the substitution of blast-furnace gas for coke-oven gas in heating the coke-ovens. Such a change would release the whole output of oven-gas for the heating furnaces, soaking pits, and open-hearth furnaces. The Providence plant has demonstrated that as low a coking time can be secured with producer gas as with coke-oven gas.

IRISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Dublin.

AGAIN Dublin was chosen for the annual meeting of the Association, which was held last Tuesday in the Council Chamber of the City Hall—under the presidency of Mr. H. W. SAVILLE, late of Drogheda, and now of Wexford. When the Lord Mayor of Dublin entered to extend a welcome to the Association, the attendance of ordinary members was the largest so far recorded at any previous meeting.

A WELCOME.

The PRESIDENT having called the meeting to order,

The LORD MAYOR (Mr. Lawrence O'Neill) said it was a graceful compliment they had paid him in asking him to open the proceedings. It had, however, just struck him that it was not inappropriate that he should do so, and that the meeting should be held in the City Hall. Most of the citizens, at any rate, looked upon the hall as the abode of love, light, and learning. The Secretary had told him that this was the thirty-second annual meeting of the Association. They were therefore getting fairly advanced in years; and he hoped they would advance still further, in spite of the electric light, and that the meeting that day would be, like those of the past, of advantage to the members and to the community for which they were catering. There was rather a long programme to get through; but a question which particularly appealed to him was that of coal. He presumed that, even in these days of experiments, they had not yet advanced far enough to make gas without coal. He would like them to consider during the meeting whether they could do anything to help the citizens of Dublin and of the other towns throughout the country to secure more coal—or, at any rate, if the members were able to get more coal for themselves, that there would be a good surplus left over which would keep Dublin from going short during the coming winter.

THE PRESIDENT'S MEDAL.

The LORD MAYOR (proceeding) remarked that he had now the pleasant duty to perform of handing the Association's medal to the President. He had not had the privilege of knowing the President before entering the room; but he felt sure, from the little he had seen of him, that he was a most affable, kind, noble-hearted, and generous man, and one worthy to be their President. The medal would serve to remind the President, and those who came after him, of the esteem in which he was held by his fellow members.

The PRESIDENT, in returning thanks, said he was deeply grateful for the kind words which had been uttered, and for the medal which the Lord Mayor had handed to him. He moved a hearty vote of thanks to the Lord Mayor for coming and giving them so hearty a reception. They had occupied that chamber so often that they had, perhaps, come to almost look upon it as a right; but at the same time it must not be thought that they did not appreciate the kindness shown in placing it at their disposal. They did greatly appreciate it, and looked forward to their meetings in Dublin because of the cordial welcome they always received from the Lord Mayor and officials.

MAKING GAS WITHOUT COAL.

The PRESIDENT (continuing) said that as to the Lord Mayor's remark about making gas without coal, they were, of course, doing this already; but the trouble was that they could not make enough of it. They were helping the citizens of Dublin in the sense that when the war began it was perhaps quite common to get (say) 10,000 c.ft. of gas per ton of coal; whereas many of them were now working up to 14,000, 15,000, and even 16,000 c.ft. per ton—thus enabling other people to obtain more coal. In fact, it might be taken that they were now working with from 20 to 25 p.ct. less coal than in pre-war days. They did not much fear competition by the electric light, so long as it was on a fair basis; for they aimed at giving the best service they could at the lowest possible price. He moved a hearty vote of thanks to the Lord Mayor and the officials for the kindness they had always shown them.

Mr. H. KIRKHAM (New Ross) seconded the motion, which was carried by acclamation.

The LORD MAYOR, in acknowledging the vote, again expressed the hope that the deliberations of the members might prove of service to themselves, and above all to the country.

THE REPORT AND ACCOUNTS.

The HON. SECRETARY AND TREASURER (Mr. George Airth, of Dundalk) then read the report, in which the Committee urged the members to attend the meetings in far larger numbers, so that subjects brought before the Association might receive the attention they deserved. The Committee went on to say that the deputation who appeared a year ago before Mr. Shortt, K.C., M.P. (the Irish Secretary), regarding the coal position, were very kindly received by him. Mr. Shortt promised to do all he could to make their appeal effective; but the Committee regretted that the Coal Controller took his own way in the matter, with very little good to their cause. A scheme for a Commercial Section had now been formulated, which would be brought before the meeting. The Committee besought the hearty co-operation of all members to assist Mr. Brook, who had undertaken this work, to make it a success. The Hon. Secretary had been in almost constant correspondence with the Shipping Controller (Mr. Burgess), about the reduction of freights, but with no effect. The Committee viewed with great apprehension the recent rise in the price of coal, which they felt sure would involve still greater hardships, by increasing railway and shipping rates. The Committee regretted that, for financial reasons, they had been compelled to sever their connection with the Institution of Gas Engineers. A letter was sent out by the Secretary to every gas manager in Ireland who was not a member of the Association, pointing out the benefits to be derived by joining it. The result had been that, subject to ballot, eighteen new members would be added to the roll. The question of the status and remuneration of gas managers should lead to a good discussion. The Committee had already done what they could towards bringing management remuneration into line with the increased cost of living and advances to workmen. They hoped a suggested scale of remuneration would be agreed upon which could be brought before the directorates of all gas companies and councils for their consideration. The Committee regretted that they had to record a number of deaths of members, extraordinary members, and friends—Messrs. W. Kneeshaw, J.M'Grath, R. G. Taylor, Thomas Whimster, A. Mackenzie, Robert B. Main, and Mrs. C. Todhunter. To those bereaved, they extended their deepest sympathy.

Mr. G. W. NORMAN (the Hon. Auditor) then read the abstract of accounts, which showed receipts amounting to £44 11s. 6d., and a balance brought forward of £38 13s. 6d. Deducting the year's outlay of £48 2s. 3d., the sum remaining in hand was £35 2s. 9d.

The report and accounts were adopted, on the proposition of Mr. A. S. BROOK (Lisburn), seconded by Mr. P. J. M'EVOY (Midleton).

THE SUBSCRIPTION INCREASED.

Mr. M'EVOY said that a year ago he expressed the opinion that an increase in the rate of subscription was absolutely necessary, if the Association was to survive. He was still of opinion that it should be raised 5s. a year, to 10s. If they took into account the increased cost of everything, they would all agree that this addition would be no more than fair. There should be at least £100 in hand in the case of an Association of this kind.

Mr. H. KIRKHAM remarked that the matter was well threshed-out a year ago. Someone should give notice of his intention to raise the matter again at a future meeting.

Mr. M'EVOY said he would propose that the subscription should be raised to 10s. They ought to give the officers every facility for carrying on their work.

Mr. J. WOODS (Monaghan) seconded.

Mr. H. KIRKHAM moved, as an amendment, that the matter be postponed until every member had had notice of the intended increase. He himself thought the subscription was too small; but each member should have a chance of giving an opinion on the matter. This year their balance was only a few pounds less than last; and they could wait another year.

Mr. NORMAN pointed out that a year ago they had £5 5s. affiliation fee, and £3 3s. for the Institution Benevolent Fund; so in reality they were down this year considerably as compared with last. During the last few years the balance had been falling. At the present moment the subscriptions were not sufficient to maintain the Association. Something would have to be done; and if the subscription was not increased they would either have to get more members or curtail expenses in every way.

Mr. L. G. YOUNG (Carlow) seconded the amendment.

On a show of hands, the amendment was declared lost; and the original resolution was then put to the meeting and carried.

A PROPOSED COMMERCIAL SECTION.

Mr. BROOK was then called upon to introduce the subject of a proposed Commercial Section. He said that on several occasions this matter had been talked about; and it was now about time that they got some scheme into shape. As was stated in the report, he was about to endeavour to bring the idea to success; and he would shortly be taking the first step of sending out circulars asking members to join. It would again mean money; it was impossible to run these things without it. But it need not necessarily be very expensive; and he thought about 5s. a year would cover postage and printing. First they would be asked if they would join the section and supply information. Next numbered cards would be forwarded, and a key would be provided so that only members would know to which works the numbers applied. He hoped to have a ready response. The sections, he believed, were already in operation in connection with every Association except their own. They had been found very beneficial; and he himself had greatly felt the want of such a section, by reason of the fact that so many changes had recently taken place in the price of coal, while there had been no corresponding changes in the rates obtained for residuals. Those of them who read the Technical Press must be aware of the great amount of useful work that had been done by Commercial Sections in the British Isles. He hoped that everybody would reply in some form or another. If anybody had difficulty in understanding the position after the printed matter had been sent out, he would be only too pleased to answer questions.

The PRESIDENT emphasized the fact that this was only to be an experiment for twelve months. It was hoped that, from this point of view, all the managers in Ireland would respond, so that they might see what good could be done. In Ireland, of course, they were greatly isolated. They could not personally consult their brother managers without the expenditure of much time; and then, perhaps, they failed to get help. Mr. Brook had volunteered to take the scheme in hand for a year; and the Committee thought the experiment should be tried. If there was any objection, they would like to hear it now, rather than that any members should stand-out of the scheme.

Mr. J. E. ENRIGHT (Limerick) said he certainly thought the introduction of Mr. Brook had been very vague. Mr. Brook expressed the hope that every member would join the section, on a subscription. Was it the individual members of the Association who were to be asked to join, or the owners of the undertakings?

The PRESIDENT: It is the owners. If you have not their consent, you cannot join.

Mr. ENRIGHT: It will be very difficult for members to take up correspondence, if this matter is not made clear in the first instance. It would be a very useful section of the Association.

Mr. WOODS said, supposing one works was selling tar at 6d. to 8d. a gallon, while another was contented with 4d., would the latter be able to send tar into the first-named district at the lower price? And the same with coke. There were many things to be considered.

Mr. T. J. REID (Ballina) inquired whether the scheme was to be forwarded to all gas concerns in Ireland, or merely to those represented in the Association. It would be a pity if they could not get every gas-works.

The PRESIDENT replied that practically he thought it would be the whole.

Mr. M'EVOY considered it advisable to try the experiment.

Mr. BROOK stated that, in the circular to be sent out, all particulars would be given. As to whether it should be the managers or the owners who would pay the money, anyone who was connected with a council might have difficulty in getting the authority to pay unless it was stated to the Local Government Board Auditor that useful information was being obtained. Apart from this, there was no reason why managers should pay the cost themselves. It had usually been found workable for an undertaking to give their word that they would not send any of their products into a neighbouring town at a less price than was being received in that particular town. It was not the intention to send the circular to every gas undertaking, but only to members of the Irish Association. This, however, he understood would cover nearly all gas undertakings after the present meeting.

The PRESIDENT said that, at any rate, he thought they were all in agreement that they would consider the scheme when it was formulated by Mr. Brook. He hoped a sufficient number would join to repay that gentleman for all the trouble he had taken, and was taking, in the matter.

OFFICE-BEARERS AND NEW MEMBERS.

The Scrutineers (Messrs. J. H. Barrett, of Bangor, co. Down, and L. P. Phillips, of Dublin) subsequently reported that the following had been elected:

President—Mr. W. E. Young, of Queenstown.
Vice-President—Mr. P. B. Ellacott, of Newry.
Members of Committee—Messrs. J. K. Harrison, of Armagh; P. J. M'Evoy, of Midleton; J. O. Halliwell, of Mullingar; and (in place of Mr. J. Paterson, of Deal) M. J. Treacy, of Wicklow.
Auditor—Mr. G. W. Norman, of Dublin.
Hon. Secretary and Treasurer—Mr. G. Airth, of Dundalk.
New Members—Messrs. J. Canning, of Balbriggan; J. M'Nicholl, of Cork; H. Dumbleton, of Dublin; W. Donegan, of Dungarvan; J. O'Flagherty, of Galway; J. Devlin, of Keady; P. M'Carthy, of Kells; M. H. Laville, of Kinsale; J. W. Shaw, of Killarney; D. Drohan, of Lismore; L. W. Dalby, of Magherafelt; T. Burke, of Malahide; R. O'Driscoll, of Mallow; A. Byrne, of Naas; P. O'Brien, of Navan; J. Flannery, of Nenagh; T. N. Walsh, of Roscommon; P. J. Rooney, of Strabane; M. Spittle, of Thurles; and D. O'Connor, of Warrenpoint.

PLACE OF NEXT MEETING.

The HON. SECRETARY said he had had a communication from Mr. W. E. Young, of Queenstown, their President-Elect, tendering sincere thanks for his nomination as President for next year, and making the request that they should hold their next meeting in Queenstown, if the members could see their way to do so. Personally, he would like to fall in with the views of their President; but in this particular case he really could not recommend the Association to go to Queenstown, because of the unfortunately high railway fares prevailing in Ireland. It would be a very long journey for many members; and therefore he proposed that the meeting next year should be held in Dublin.

Mr. BROOK seconded this.

Mr. WOODS thought the arrangement was that every third year the meeting should take place in Belfast.

The HON. SECRETARY said they could hardly hold the meeting in Belfast, with the President coming from Queenstown. When the President was from Newry, they could think of going to Belfast.

Mr. WOODS proposed, as an amendment, that the meeting be held in Belfast.

Mr. M'EVOY said that, although he came from County Cork, he thought that Dublin was the best centre.

Mr. YOUNG, speaking for his brother, said that, under the circumstances, he thought Dublin would be the best place.

Mr. BROOK: Is there on the books of the Association any rule that the meeting should be held two years in Dublin and one in Belfast?

The HON. SECRETARY: It is an "unwritten law."

The amendment was not seconded, and the proposal to meet in Dublin next year was agreed to.

THE PRESIDENT'S ADDRESS.

The President then proceeded to deliver his Inaugural Address, which was reproduced on p. 395 of last week's issue of the "JOURNAL." He, however, made the following

ADDENDUM TO THE ADDRESS.

With the prevailing conditions of a more or less permanent shortage of coal, the question of auxiliary plant, either of carburetted water gas, carburetted hydrogen, or blue water gas plant, is one in which even the smallest works is interested.

In these circumstances, I thought that it would be interesting to give our working results taken from the last week's working with a mixture of carburetted water gas of 40 to 60 p.ct. coal gas at present prices of coal and labour costs with 47-hour week, which is the basis on which costs must be now reckoned.

Coal Gas per 1000 Cubic Feet.

	s.	d.
Coal and all charges thereon	5	10·0
Less residuals	3	10·6
Net cost of coal	1	11·4
Labour, purification, and repairs	2	2·2
	4	1·6

Carburetted Water Gas per 1000 Cubic Feet.

Oil, ¾ gallon	1	0·0
Coke, generator and boiler, 60 lbs.	1	11·1
Labour, purification, and repairs	0	5·8
	3	4·9

This makes the cost of manufacture of the mixed gases 3s. 10·1d. per 1000 c.ft., as against 1s. 10½d. in pre-war days. The working of double shifts in the winter season will reduce the fuel in boilers considerably in water-gas plant; and we also intend adapting the boiler for breeze burning instead of coke, at present valued at 70s. per ton.

The general results are not what we desire, but the class of coal that the Controller has allotted us, and the necessity of obtaining up to 16,000 c.ft. per ton—to make the quantity supplied last out with plant in the last stage of exhaustion through inability to obtain material for repairs, and small storage capacity—means keeping the boiler under fire all the time.

The fact that the maximum pressure that could be allowed during last winter season was only 8·10ths, speaks volumes for the difficulties of the present times, and which are not conducive to good working.

It was agreed that any remarks the members might have to make on the address should be incorporated in the discussion on the subjects which Mr. Reid and Mr. Ellacott were about to place before the meeting.

THE PRESENT AND FUTURE POSITION OF SMALL GAS-WORKS IN IRELAND.

Mr. T. J. REID (Ballina) was down on the programme to give a paper on the "Present and Future Position of Small Gas-Works in Ireland." He said, however, that he had not prepared anything. The matter seemed to him to be so serious—and one which must have occupied the attention of every member of the Association for a considerable time past—that more free and easy methods of discussion might perhaps better meet the situation than a set paper. It was true that the changes of the past five years, from which the gas industry in Ireland had suffered severely, had brought about new conditions; and it would be well to take stock of things. This was the text for such remarks as he might have to make. The question was bound up with the very life of the Association; and the conclusions that they might have to come to after discussing the matter might be such (though he hoped they would not be) as would determine the end of the Association. He sincerely trusted it might not come to that; but he wished to emphasize the fact that the situation really was downright serious. It might be argued that the subject was so well known to everyone of them that it was useless to discuss it, and that discussion alone could not bring relief. But though no relief might be obtained, yet a great measure of comfort might be derived from the mere relation of their woes, and some might be afforded consolation by the knowledge that others were in an even worse condition than they themselves. It was not a time for long speeches; and he would address himself directly to the difficulties with which small gas concerns had to contend. These difficulties were both managerial and administrative.

He would take the managerial side first. In the very forefront came coal, about which so much had been heard. To use the Premier's words in the speech he had just delivered in the House of Commons, the position so far as the price of coal was concerned was "most disconcerting." He stated that the pit price had increased from 10s. 6d. per ton in 1913, to 26s. per ton at the present time. Freights, they knew, had increased five-fold; and therefore they were in a far worse position than were small concerns in England or Scotland. Then there was the question of wages and labour. Wages had increased three-fold. And, not only this, but there was a tendency on the part of labour not to give the return for the money received in wages that was hitherto the case. This in itself was perhaps a more serious problem than the question of the actual increase in wages. Then the price of every material with which gas undertakings had to do had increased. Meters and cookers, and all other things of the kind had gone up enormously. They were all familiar with the flutter of circulars which heralded these increases in price. They had got rather apathetic in regard to them, and had come to take them as a matter of course; but it was a subject which must prevent "reconstruction"—a word they heard bandied about so much—and increase of production, and all that sort of thing. The price of gas, of course, had been put up in proportion (or nearly in proportion) to the increase in coal and other materials; and yet, though the price had been so increased, it did not meet the position. That was, it did not balance the increase in the cost of production; and it added to the difficulties with which they had to deal, because if they increased the price of gas beyond a certain figure, they would stop the development of its use. This applied more to Ireland than to England or Scotland, where people were sometimes compelled to use gas, whereas in Ireland they were able to do entirely without it, or to use some other method which might tide them over the temporary difficulty. Then the country had been so prosperous during the past five years that, with the increase in price, gas, which was never popular in Ireland, had decreased in popularity—or rather its unpopularity had increased—and people had turned with great avidity to the consideration of electrical plants. They saw all over the country attempts being

made to instal electricity, quite regardless of the question of whether or not such enterprise would pay. It was a matter with which the small gas-works had to contend, and one which made a serious outlook for them. These were some of the principal managerial difficulties.

Then there was the administrative side—the serious financial difficulties. It was easy for anyone to understand that, with the prices of coal and all other materials increasing as they had done, a far greater amount of working capital was required. He estimated that a gas-works would now need at least five times the amount of working capital that was necessary in pre-war times. Where was this to come from? Bankers were not at any time favourable to lending money on the security of gas concerns, and the difficulty of providing the necessary increases of capital was a very serious aspect of the matter, and was, in his opinion, responsible for the closing-down of many works.

These were only some of their difficulties. The point was, what were they going to do with regard to the future? Ought they to adopt electrical schemes themselves, as some of the gas concerns were doing? Should they, following the trend of gas manufacture, go in for the new gas of low calorific value, by which they would be able to gasify the coal entirely? Or should they merely mark time, and spend nothing, in the hope of better times coming? These were a few questions he put to them; and he looked to the meeting to give some answer. He thought it better to reserve his own answer to the questions till others had given their opinions. He had advisedly not gone to the trouble of writing a paper, because he thought that sometimes authors, when preparing a paper, in the endeavour to construct something creditable, padded it out to an extent which was not necessary.

STEAMING OF HORIZONTAL RETORTS.

Mr. P. B. Ellacott (Newry), then read the following paper, which it was arranged should be discussed along with what had gone before.

During the past year I have endeavoured to conserve the supply of coal available at the Newry Gas-Works by producing blue water gas by steaming our horizontal retorts; and I have thought a description of the experiments, and the experiences gained, would be of interest to members of the Association.

In the autumn of last year I decided to try steaming the retorts; and my first trial was with materials already to hand on the works, which could be temporarily used for the purpose. My first experiments were with steam delivered straight from the boiler, through the back-end of the retorts, into a cast-iron superheater and distribution box, laid within the retort—the steam being regulated by a valve at the entrance to the retort. The retorts are Ω-shape, single-end pattern; and their dimensions are 22 in. by 16 in. by 10 ft. The superheater was made out of a shallow cast-iron channel of heavy section, originally made for a coal cart track. The dimensions of the channel were 6 ft. long, 11 in. wide, 1¼ in. deep; and the thickness of the sides and bottom was 1 in. Within the cast-iron channel I fitted two loops of ½ in. wrought-iron steam-pipe (which ran twice the length of the channel), and fitted a loose cover to it. In the cover were drilled two rows of ⅝ in. holes, 6 in. apart, the whole length of the superheater.

The superheater as described was laid in the retort with one end against the back of the retort. Steam was admitted at that end; passed up and down the length of the superheater through pipes; and finally discharged within the box. This highly superheated steam then escaped through the holes in the covers into the incandescent coke, and gave very good results in the production of blue water gas.

My reason for selecting cast iron as the material for the superheater was that I thought a certain amount of the oxygen of the steam would combine with the red-hot cast iron, forming oxide of iron, and hydrogen would be liberated—thereby producing a gas with a higher hydrogen content and of greater calorific value. In this I was not disappointed. The gas obtained was very good. I have not made better gas by steaming from any other system I have since tried. I should have liked to have made an analysis of the gas, but have no testing apparatus.

This system ran all right for a week or two, and then failed. I thereupon withdrew the superheater from the retort, removed the loose cover, and examined the pipes inside. I found the pipes had become calcined by the action of the heat and steam, and were broken in several places. In the sample of the calcined pipe I have here, you will observe that a curious change has been wrought. In substance it is like cast iron. There is an increase in weight and thickness; the bore being reduced to about half the original diameter. I also found that most of the holes in the cover had become closed. I saw that to continue this method of superheating would be costly, as exposure to high heats destroyed the pipes and would mean constant renewal; so I decided to try some other method of superheating the steam.

In passing, I will say I do not claim originality in bringing steam into contact with red-hot iron within the retort. The process has been tried before, and is almost as old as the industry.

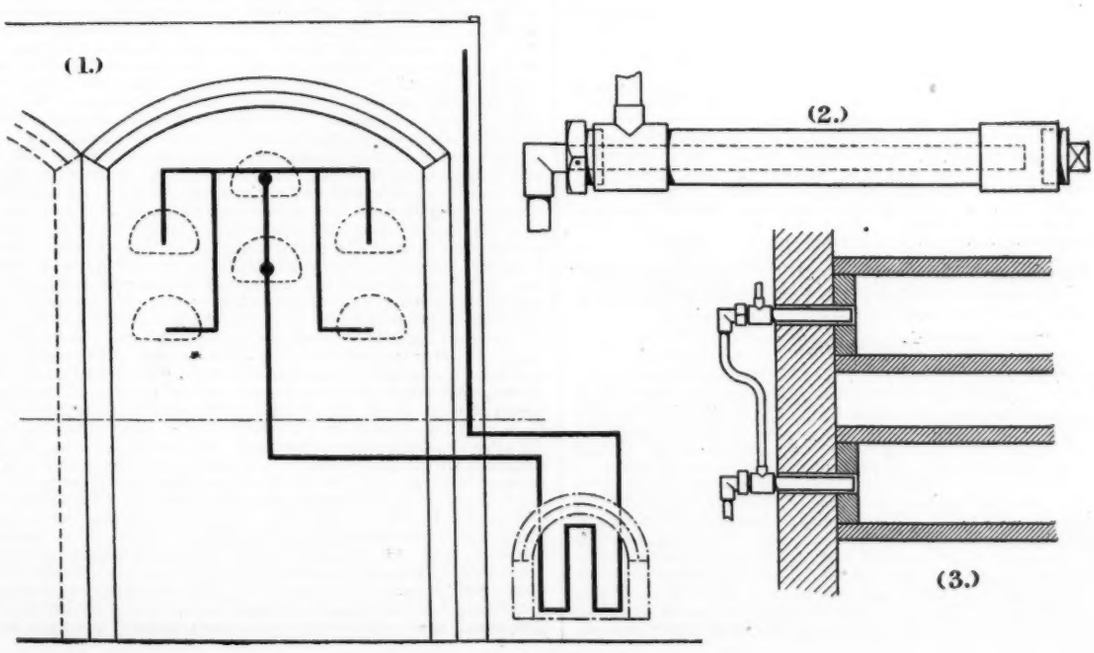
My present method of steaming is with superheated steam delivered into the retort at the bottom of the back-end. The steam pipe does not protrude into the retort. The arrangements for superheating the steam are as follows: The steam pipe is first run twice across the top of the bed, embedded in the hot brickwork; and then down the back of the bed to three loops of pipe placed in the main flue, at the end of the bench, where the flue turns at right angles to enter the chimney. In the flue the pipes are subjected to a dull red heat. From the main flue the pipes return to the back of the bed; and the steam is finally superheated in two 2 in. pipe superheaters placed in holes in the wall, through to the back of the two central retorts. After leaving the superheater at the back of the top central retort, the steam is distributed to the four steaming retorts. All the external portions of the pipes are covered with non-conducting material.

Sketch No. 1 indicates the general run of the pipes; No. 2 shows the 2 in. superheaters, with a ¾-in. pipe placed inside a 2-in. pipe; while No. 3 shows the superheaters in position at the back of the retorts.

This rather lengthy way of running the steam pipe was designed to give efficient superheating, and at the same time to avoid exposing the pipes to the destructive influence of high heats. I find this arrangement for superheating efficient; and it does not give trouble. But I admit there are defects in the method of bringing the steam into contact with the coke.

The method of steaming which I use is that the retort is first charged and completely filled with coal, with the steam turned off. The heavy coal charge is usually carbonized within twelve hours. The coke is then allowed to remain in the retort for a further period of 36 hours for the production of water gas. The four retorts are recharged regularly and in rotation; and I find that a mixed gas of fairly even quality can be maintained.

Coal gas diluted with water gas gives a low-grade gas containing a low percentage of incombustibles, and is far better value than coal gas adulterated with air, and containing a large amount of incombustibles.



As regards the increased depreciation of retorts through steaming, there is very little injury caused if the 36 hours' steaming period is not exceeded. The retorts at present in use for steaming have already worked for 888 days, and are in good condition although used for steaming for six months.

To test the gas produced by steaming I use a counterbalanced test-holder, connected separately to each mouthpiece. By manipulating the weights, I put a vacuum on the holder, and draw off a sample of the gas produced by a retort. It can then be tested at leisure. I use a boiling-ring and kettle of water for testing purposes.

As to the results obtained from steaming, reviewed at the end of the financial year, the net profits are the highest for many years, which I attribute directly to the adoption of the steaming system. From the beginning of November, 1918, to March 31, 1919, with steaming, 1294 tons of coal were carbonized, producing 18,444,000 c.ft. of gas. The gas made per ton of coal carbonized averaged 14,200 c.ft. The coke sold per ton of coal averaged 8 cwt. Without steaming for the corresponding period 1917-18, 1668 tons of coal were carbonized, producing 20,021,000 c.ft. of gas. The make per ton of coal was 12,000 c.ft. The coke sold per ton of coal averaged 9 cwt.

On examining these results, it will be seen that had the making of straight coal gas only been continued during all last winter, 1537 tons of coal would have been consumed to produce the 18,444,000 c.ft. of gas. But the actual coal used was 1294 tons—a difference of 243 tons saved by steaming. There was a reduction in coke sold of 1 cwt. per ton of coal carbonized—equalling 64 tons of coke during the period mentioned.

The gas produced was of better quality than the previous year, showing a fair light from a modern flat-flame burner, and giving very good incandescent lighting.

Steaming, considered solely as a means of economizing coal, saved 15 p.ct. = 243 tons of coal in the period under review. This saving of coal, viewed in relation to the loss of coke produced for sale, showed:

Cost of 243 tons of coal delivered into works at 48s. 6d. per ton (average)	£589	5	6
Less cost of 64 tons of coke valued at same price as coal	155	4	0
Amount saved	£434	1	6

Finally, considering the permanent adoption of the steaming system as a means of increasing the revenue derived from carbonizing a ton of coal, and taking prices as they are on medium-sized gas-works in Ireland to-day, we have:

With Steaming.				Without Steaming.			
14,200 c.ft. of gas at 6s.	£4	5	2	12,000 c.ft. of gas at 6s.	£3	12	0
8 cwt. of coke at 2s. 6d.	1	0	0	9 cwt. of coke at 2s. 6d.	1	2	6
	£5	5	2		£4	14	6
	4	14	6				
Difference in favour of steaming	0	10	8				

I have not taken into consideration the other residuals—tar and ammonia. Steaming tends to increase the production of these residuals.

Steaming retorts has labour-saving advantages. As an instance, on Sundays, when most works usually shut-down for a number of hours, the whole of the retorts could be steamed and the resultant blue water gas stored in a relief holder, and then mixed with coal gas during the following week.

I append the results of a six weeks' trial of temporary retort steaming equipment, supplied by the Devon Gas Association, Ltd., and compare them with results obtained without steaming during the corresponding period of the previous year. The coals carbonized were carefully weighed, and every means taken to make the test reliable.

	With Steaming.		Without Steaming.
Coal carbonized, tons	392	..	547
Gas made, c.ft.	5,892,000	..	6,153,000
Gas made per ton, c.ft.	15,030	..	11,248
Coke sold	141 tons 11 cwt.	..	222 tons 14 cwt.
Coke sold per ton of coal carbonized	7·2 cwt.	..	8·1 cwt.

The Newry Gas Committee have taken the initial step in making steaming a permanent process, by placing a contract for the installation of "channel" or "trough" retorts.

DISCUSSION.

Mr. P. B. Ellacott (Newry) said they had to consider what their future policy should be, for they certainly could not sit down and do nothing. Their expenses were running up. The question, he thought, for them to consider as an Association was what should their policy be for the forthcoming year, having regard to the price of coal. He had his own ideas of what to do, and they were embodied in his paper.

Mr. T. Frizelle (Holywood) said they were under a debt of gratitude to those who had brought these matters forward. Each of them had always had his difficulties; but during the last few years they had been getting very great. Mr. Ellacott had dealt with the question of steaming horizontal retorts, which was one way of to some extent reducing their difficulties. He had not, however, given them the quality of his gas, though he said that he had tested it by boiling water. If the temperature was reduced much below 800° in steaming, one would get a quality of gas which was not really worth burning. He must keep the temperature of the retorts above 800° to get a water gas which would mix with coal gas. The increase per ton of coal, including water gas, was about 2500 c.ft. This itself, on the quantity of gas Mr. Ellacott made per annum, came to something very handsome. He would like to ask at what time of year he made the water gas. Was it midwinter, when he had the maximum number of retorts going, or was it in spring or summer time? He ventured to say that he must have a big proportion of coal gas to mix with his water gas. Otherwise, if he had a number of consumers using flat-flame burners, they would get very little illumination. He found in his own case, there were a lot of people using flat flames; and they could not induce them to put in incandescent burners. There was in his town a military barracks, where practically all the burners were flat flame. They had tried their best, without success, to get the authorities to adopt incandescent burners. It was therefore necessary for them to keep their power up to about 14 candles, which they looked upon as a good quality gas at the present time. They steamed a little on the vertical retorts, to keep the extractors cool; and the average make of gas over the last twelve months had been about 13,350 c.ft. In some places he had visited over the water, the averages worked out at anything between 18,000 and 20,000 c.ft. There was no illuminating power with the gas; but it was right good gas for heating purposes and for incandescent burners. In a small place, he did not think they could afford to put much steam in during the summer months.

Mr. W. Millar (Cookstown) referred to the generation of electricity by water power, and said that in connection with one particular scheme he offered to take current if it could be sold as cheaply as his own gas undertaking could produce it, as his undertaking was contemplating going in for an electricity scheme in the district for anybody who wanted current. The electric light concern would have to put down the plant and wire the town, whereas his own people would simply have to wire the town and buy a gas-engine. For many reasons the electricity people could not produce current as cheaply as the gas-works could. The Bills coming before Parliament were very much in the air. People wanted Government money to promote these schemes; they would not put it down themselves. As to steaming, did Mr. Ellacott work with or without a steam-boiler? He himself would like to steam. But he had no boiler; and it would hardly pay to put down a boiler merely for steaming the retorts.

Mr. T. J. Reid (Ballina) said they were glad to hear something at first hand about this alluring topic of steaming. They had been rather casting eyes of envy towards those who had been getting such results with steaming vertical retorts. They would like to do the same; but they had to be moderate and modest in their ideas, and content themselves with what they could do by steaming their horizontal retorts. Mr. Ellacott had shown considerable resource in the method he adopted. Of course, steaming horizontals was not new. Mr. Ellacott had a plan of introducing steam into the retorts which was not open to all of them. Owing to the structure of his bench, he was able to introduce the steam in a very nice manner at the back of the retort. Letting the steam in at the mouthpiece end presented difficulties which this plan did not. What means, he asked, did Mr. Ellacott adopt (if any) for controlling the admission of steam to each individual retort? Why, too, did he adopt the means of superheating the steam which he had explained, and would it not have been as easy to superheat the steam in a more simple manner which would possibly have been at least as successful? Of course, the difficulty with regard to the action of heat and steam on wrought-iron pipe was what might have been expected; but the results in his amended system were better than his previous efforts. He desired to ask some plain questions—not in a destructive way, but to gain information, because if the small undertakings could show better results in their balance-sheets by this process of steaming, it was a plan they should all adopt. Considered merely from the coal conservation point of view, there was no doubt much might be said for the system. He wanted to pin Mr. Ellacott to the figures he had given, and on which his Committee had decided upon an installation of retorts specially suitable for the purpose. By steaming for six months, he saved 243 tons of coal; but then he went on to say that he lost only 64 tons of coke, which he valued at the same price as the coal. This was a wrong calculation entirely. There was no doubt the coal he could take as a credit; but why the author said he only lost 64 tons of coke, he (the speaker) could not understand. He might have been able to sell 10 cwt. of coke per ton of coal in the six months under review if he had not steamed. If he had carbonized his 243 tons extra, he would have had 156 tons more of coke. This would make a very considerable difference in the cash saving Mr. Ellacott showed; and it would do away with the idea that the steaming process was one that was going to save the industry in the future. But there was another point on which the whole working of the steaming process turned, when applied to the smaller gas-works. In a small works it might often be possible to produce the maximum output of gas, with a certain number of retorts to increase the production or to lessen the production per mouthpiece must mean the lighting-up of another bed. Take Mr. Ellacott's own works. He produced 35 millions per annum, and therefore his maximum 24 hours' output would probably be 150,000 c.ft.—which was the output that could be comfortably secured with three settings of six retorts. He had given them no information as to the production per retort of water gas, steaming as he did; but doubtless the output per retort by steaming was not so great as when carbonizing coal, and therefore the number of retorts that he must have at some period between 120,000 c.ft. and 150,000 c.ft. must be in excess of what would be necessary if he was not steaming, so that there must be a loss of fuel in respect of the retorts which he would not otherwise want. In his own case, he (the speaker) tried to adopt steaming, but was only able to continue it for a very short period, because the water gas he could manufacture per mouthpiece was not sufficient to enable him to carry on unless he laid on another bed of retorts. Therefore the steaming came to a very speedy end. Could Mr. Ellacott give them any information as to the output of water gas per retort, and also as to how he arrived at the assumption that he only lost 64 tons of coke, whereas he should have lost 156 tons? These were really the points that needed elucidation. On the figures given, he did not think the process was one which, without further explanation, would commend itself, except in cases where it was necessary to

keep a certain number of retorts in action whether there was use for them or not. Then it would be useful and profitable to steam such retorts as were not required to produce straight coal gas. Mr. Ellacott also said the shutting-down of works on Sunday might be utilized for the manufacture of water gas in the whole of the retorts, and the resultant blue water gas stored in a relief holder, and then mixed with coal gas during the following week. If Mr. Ellacott was in the happy position of having a relief holder, he (Mr. Reid) would suggest that a water-gas plant of very simple type would be a far better way of making the blue water gas, which he could mix with his coal gas at pleasure, and produce it at much less cost and more easily, and without using retorts which would not otherwise be in action.

Mr. J. E. ENRIGHT (Limerick) said the regulation of the steam was one point which had struck him. Then, could Mr. Ellacott give them some idea whether he worked the retorts under vacuum or under pressure at the period of steaming? They heard a lot about steaming of horizontal retorts; and they all knew that these increased makes of gas could be greatly exaggerated by the vacuum or pressure on the retort at the time the steaming process was in action. Perhaps the system had not been long enough in use for them to know what the wear and tear on the retorts would be with steaming. It would be of vital importance to small gas-works if the action of steaming in horizontal retorts was such that, instead of getting four, five, or six seasons out of the retorts, they had to renew them every third season through cracking-up. He was convinced that, with a cracked retort, one could not possibly steam. Once the crack opened, steaming was finished. What would be the life of the retorts if the steaming process were adopted by them? He had been making 22,000 c.ft. per ton of mixed carburetted hydrogen and coal gas, as against 14,000 c.ft. by direct steaming in the horizontals.

The PRESIDENT: What is the percentage?

Mr. ENRIGHT said it would be about 60 p.ct. water gas and 40 p.ct. coal gas. This had been done for the past twelve months, and was being done now. He recently met a man who was using similar plant; and he showed him (the speaker) his statement of figures. He was getting 28,000 c.ft. of mixed gas, and had not in any way to control the air to burners, cookers, or any other appliances; and he was selling 6 cwt. of coke afterwards.

Mr. MILLAR: Can anyone say how this steaming in horizontal retorts compares with straight coal gas mixed with methane-hydrogen gas?

Mr. ENRIGHT: That is just what I have been talking about.

Mr. MILLAR: Then apparently it is the better of the two.

Mr. W. STEEL (Athlone) said he had tried some more or less successful experiments in the way of making water gas. What he did was to put in an ordinary square high-pressure boiler, such as was used in a kitchen range. This was built-in the face of the retort-setting, shielded by means of fire-clay tiles. In this way, he could properly raise 20 lbs. of dry steam. The boiler was heated solely by waste gases—no extra fuel was required.

Mr. A. S. BROOK (Lisburn) said it seemed that no one had touched upon the suggestions made by Mr. Reid. Mr. Reid had referred to the financial position of gas undertakings all over the country; and no doubt many of the things to which he had drawn attention had come to stay. The only thing it was possible to do was to face the facts, and do the best they could. If anything, it was likely that coal would become dearer still. This was, of course, an all-important factor. As to wages, if they could only get the same return in labour as they did before the war, the increased rate of pay could be easily dealt with. Another point raised was in connection with the price of gas. In his (the speaker's) own case, they were selling gas at 3s. 8d. per 1000 c.ft. before the war; and it was now 6s. They were applying again to the Local Government Board, to get an Order to enable them to increase it to 7s. 6d. Whether or not this would prove high enough only time could clearly prove. Further than this, having practically exhausted their borrowing powers, he was preparing an application for authority to raise further money. With regard to electricity in Ireland, he must say they seemed to be electric mad. There was a little town about five miles from Lisburn where just previous to the war they put up an installation for the supply of electricity. There were gas-works already there; but neither gas-works nor electricity had paid a dividend for five years, and it seemed to him the electric light concern would never get back the money that had been put into it. Judging from actual experience, he did not think the gas industry need trouble very much about electricity. As to Mr. Ellacott's paper, he might say that he was in London during the Gas Institution meetings, and came across several people who were giving orders for plant for making blue water gas, when they already had vertical retorts. In fact, one member said that rather than steam his vertical retorts, he was going to make blue water gas in a separate plant. It would appear this was the proper method to adopt, providing the works were of sufficient size. In a small works, however, it probably would not pay for the outlay. Beyond the question of wear and tear, they had to consider the coal or coke consumed for generating the steam injected into the retorts. In a works making from 120 to 130 million c.ft. of gas per annum, it was found that this alone came to something like £500 or £600; so it was not all saving. Then they had to take into account whether there was a good sale for coke. Each one must decide for himself whether or not it would pay him to steam. A lot of these extra makes, to his mind, were being produced at the expense of the commodity which was being supplied; and in his own district it would be fatal to furnish a non-illuminating gas, because there was great trouble in getting people to convert their burners to the incandescent system.

The PRESIDENT (Mr. H. W. Saville, of Wexford), referring to Mr. Reid's address, said that, of course, it was very easy to ask questions about the effect of steaming from the point of view of wear and tear on the retorts, &c.; but one factor which had been left generally out of the discussion was the coal supplies. These had been cut-down considerably; and it was only by such methods as steaming that, in many cases, they had been able to carry on at all. It had frequently been merely a question of keeping things going, and not a matter of financial expediency. At present, at any rate, they could do nothing in regard to wages and labour, except introduce as far as possible methods of labour saving. Their best means of fighting the electric light had always been on the score of cost. When given a fair chance, they could beat it all along the line for light, heat, and power; and for this reason alone they would not increase the price of gas any more than was absolutely necessary. If electricity must be introduced into a town, there was no one better able to do this than the authority who were already in possession of the lighting business. Mr. Ellacott had proved to his own satisfaction and to that of his Committee that the steaming of horizontal retorts had been a financial success. It might be granted that to a certain extent it was so; but at present prices of coal, were they to be content with 14,000 c.ft. per ton? He thought the time had arrived when they must get up to 20,000 c.ft. How they were to do it, was a matter of indifference to the Coal Controller; but there was no doubt that this was the end to which they must work in some way or another. Mr. Frizelle had referred to consumers who refused to dispense with flat-flame burners. These people had been studied too long. If they were going to act as a drag on the wheel, the sooner they were allowed to go the better it would be. No doubt, the gas of the future was not going to be 600 B.Th.U., but something between 400 and 500 B.Th.U., according to prevailing circumstances. His answer to Mr. Reid was that it was their policy to proceed to make 20,000 c.ft. of gas per ton, by hook or by crook.

Mr. REID: How?

The PRESIDENT said many people did it already. It was simply a question of policy, and of getting the necessary money.

Mr. ENRIGHT remarked that Mr. Reid had asked what their future policy was to be. He would respectfully suggest that, though they might propose and recommend what the future policy of gas undertakings was to be, they had no authority to determine what the policy was to be. It was a question of bringing together those who controlled the gas undertakings of Ireland, to decide upon the future policy of the industry. They themselves were, after all, only servants. It seemed to him, however, there was not the slightest doubt that the future policy would be to take out of the coal, by steaming or any other means available, sufficient to give 20,000 c.ft. to the ton; and they knew what this would mean when it came to the users of flat-flame burners. Could they afford to lose any consumer, before the State came to their aid and compelled the consumers to accept a gas of a certain quality? Until this time arrived, could it be definitely determined what quantity of gas should be sent out per ton of coal?

Mr. REID said he was extremely disappointed with the remarks that had been made in the effort to reply to the questions which he had addressed to the members. He did not think they could realize the position in which the gas industry was; otherwise they would not have disposed of the very cogent questions he had put in the cavalier manner they had. The only members who had attempted to reply were Mr. Brook and Mr. Enright; and even they showed a negation of policy which was lamentable in a body of gas engineers like those gathered together that day. If all the counsel and all the comfort for the future that were to be obtained, were to be derived from the remarks he had heard, then the gas industry of Ireland was at an end, or soon would be so. But though he might have struck a rather pessimistic note in his original remarks, he would like now to be more optimistic. They were living at a time when it was very hard to assess values. Events had succeeded each other so rapidly, and values had changed so very quickly, that it was impossible to tell just where they stood at any particular time. Therefore he thought that, even though the outlook for the gas industry, so far as it applied to small concerns in Ireland, might be a little dark and forbidding, yet it might not really be so bad as appeared at first glance to be the case. If they considered the value they were giving in light, heat, and power, they could take some hope for the future, because compared with any other method of performing these services, the gas industry, even in the smaller places, could show the best results. The question of what material they should use for the production of their gas was a serious one; and it was certain that coal would be harder to get. There was no use in approaching the problem by thinking in terms of yesterday. In his opinion the only hope for the small gas concern was to go straight for the quality of gas that was recently advised by the Committees entrusted with research. This was a gas of 350 B.Th.U., or thereabouts; and the best method of producing it was by means of some of the water-gas systems now on the market. The fuel that could be used was perhaps their own native peat, with such coal as might be available. This was his solution of 20,000 c.ft. or even more per ton. There was no use in any longer considering the flat-flame consumer. These were new times, and new methods must meet them. The only way, to his mind, by which the smaller gas concerns could continue to exist was by approaching the question of gas production from an entirely different standpoint than hitherto, and by making such a gas as had been recommended to them by the very highest authorities in the industry. They were told that the world was reeling from the great shock of the war, and that sooner or later things would return to their proper level; but it was not for them to sit down and await this time, because while they were waiting the industry of which they should be the saviours might become non-existent.

Mr. ELLACOTT said his gas was about 12-candle power. The time of the test was midwinter. The proportion of water gas to coal gas was from 10 to 15 p.ct., as near as he could get it. He did not know exactly what was meant by the remark about 800° temperature. The best temperature for producing the blue water gas he believed, judging by the colour of the retort, from 1800° to 2000°. He had a steam-boiler, as all the machinery was driven by steam. For steaming horizontal retorts, one really did not require much pressure. About 2 lbs. of superheated steam admitted was about all that was needed. The reason why he adopted his particular method was that he had space available at the back of the retorts; and to keep everything out of the way of the stokers, he utilized this. There was a valve arrangement by which the steam was reduced to about 2 lbs. pressure at the entrance to the retort. The 9 cwt. of coke per ton represented net sales to the public. He did not include that used for the sulphate plant or for exhauster driving; and he said that by the adoption of the steaming process he lost about 1 cwt. per ton of coal carbonized. After all, it was not primarily a question of steaming, but a conservation of coal. Of course, one could produce by steaming something like 17,000 c.ft. as an average for the year; but he would not think of keeping a

retort-setting going specially for the production of blue water gas by steaming. He had no means of ascertaining the output of water gas per retort; it would need a separate meter. The relief holder was the second holder. One could have all the retorts fitted for steaming, and do this on Sunday. It would only require one man to attend to the fires. He, of course, kept careful watch over the quality of the gas.

Mr. Enright pointed out that steaming opened all the pores of the clay retorts.

Mr. Ellacott replied that one must see that regularly the retorts were not all producing blue water gas. If one overdid it, and steamed the charge too long, one would come to grief. With steaming for 36 hours, and with a bed which was not by any means a new one, he did not notice any damage. The temperature increased as the period of steaming went on; but he did not find the difference had any effect on the wear and tear of the retorts. Mr. Steel's idea was a very good one, for his steam cost him nothing. Steaming not only saved coal, but it saved capital expenditure. After all, water-gas plants were rather expensive at the present time, even for small works. He had not a calorimeter, but judged the gas to be about 450 B.Th.U. They had been told they would have to do with 25 p.ct. less coal in Ireland; and this was really why he adopted steaming.

Mr. Steel remarked that he was interested in one or two small gas-works in Ireland; and he quite agreed with what Mr. Reid had said. It was a puzzle to him, as it was to Mr. Reid, to know how they were going to get 20,000 c.ft. per ton with the coal they had had to use. The Coal Controller promised them the coal they wanted, less 25 p.ct. But the greatest grievance they had was on the score of the quality of the coal they had been getting. It seemed to him that gas engineers in Ireland might try to bring pressure to bear on the authorities, so as to secure a better quality of gas coal. The thing that was most detrimental to their interests was that they should have to pay an excessive price for an inferior quality of coal, by which they lost 2000 c.ft. of gas and almost 3 cwt. of coke per ton. If they did not get the same coal as before, with the prices they now charged for gas they could not exist.

The President remarked that most of them were connected with statutory undertakings, bound-down in the matter of prices, &c. So far as they knew, they had only until October to enjoy this freedom of action; and it was really up to them to make a stir somehow. They had tried to do it through the National Gas Council; and no doubt when the time came the period of relief would be extended. But it was only going on from hand to mouth; and they could not decide upon a policy for the future until they knew what the Government were going to do. They had endeavoured in many ways to approach the Coal Controller; but, as a matter of fact, the Shipping Controller, so far as they were concerned, was worse than the Coal Controller. The Shipping Controller had been approached; but the only answer obtained was that he could not see they were making excessive profits at present rates. The National Gas Council had certainly stood well by them and fought their battles, and it was up to everyone to join with them and do what they could.

Mr. Steel said he thought the gas companies of Ireland were important enough to have a representative of some kind who knew what they wanted. They should have some one who would take care to see that every gas-works had its own share of coal. There had been some very unfair treatment meted out.

Status and Remuneration of Gas Managers.

At the close of the discussion, a meeting was held to consider the status and remuneration of gas managers; and after considerable debate, the members present (numbering 27) all signed an agreement either to become members of, or affiliated with, the National Association of Technical Gas Officials.

The Excursion.

The whole of the following day was devoted to an extremely enjoyable excursion, in gloriously fine weather, to Enniskerry and the Dargle. Over fifty members and friends joined in the outing. After dinner (in view of the fact that this year the more formal annual dinner of the Association had been dispensed with) there was some speech making, short and to the point; while tea was followed by music and song.

COAL CARBONIZATION AND WASTE HEAT UTILIZATION.

From a Paper by W. T. Lane.

Last month's issue of the "Proceedings of the South Wales Institute of Engineers" contains the full text of the "Lewis First Prize, 1918," paper by Mr. W. T. Lane, on "Fuel Economy in Power Production, or Utilization of Waste Heat." The section relating to the "Carbonization of Coal" is reproduced below.

The Carbonization of Coal and the Utilization of the Waste Heat and Gases.

This industry has now become one of the foremost of national importance, and occupies one of the premier positions in the problems of reconstruction and reorganization of the nation's resources.

The destructive distillation of raw coal is at present carried out by two large industrial branches:

(1) The gas industry, which at the present time carbonizes about 18,000,000 tons of coal per annum.
(2) The coke industry, which carbonizes about 20,000,000 tons per annum.

With reference to the coking industry, it can be definitely stated that in the majority of cases the modern regenerative oven is by far the most economical oven of its kind. In the interests of fuel economy and the most efficient utilization of coal in this particular direction, all beehive ovens and other wasteful non-recovery of bye-product ovens should be scrapped, and their wasteful methods abolished.

The following data illustrate the great gain derived from the coking of raw coal in bye-product ovens as compared with beehive ovens:

Assume that 20,000,000 tons of coal are coked in both instances.
(1) Average yield of coke in beehive ovens = 55 p.ct.
(2) Average yield of coke in recovery ovens = 70 p.ct.
(3) Yield of benzol per ton in recovery ovens = 1 to 3 gallons.
(4) Yield of anhydrous tar per ton in recovery ovens = 55 to 85 lbs.
(5) Yield of sulphate of ammonia per ton in recovery ovens = 20 to 30 lbs.

—	Beehive Ovens.	Recovery Ovens.
Coke	11,000,000 tons	14,000,000 tons.
Sulphate of ammonia .	None	178,572 to 267,857 tons.
Tar	,,	491,070 to 670,000 tons.
Benzol	,,	20 to 60 million gallons.

Or, taking the average yield of the bye-products, the gain is approximately 3,000,000 tons of coke, 223,210 tons of sulphate of ammonia, 580,500 tons of tar, and 40,000,000 gallons of benzol.

In 1913, about 5,362,000 tons of coal were carbonized in beehive ovens, and about 11,637,000 tons in recovery ovens. The loss of valuable bye-products can well be appreciated.

Beyond this, the additional waste heat and surplus gases have to be considered. These in all cases should be utilized for some purpose or another. The waste heat from beehive ovens, which is only occasionally utilized, has an evaporative capacity of about 0·7 ton of water per ton of coal carbonized. In waste heat recovery ovens the evaporative capacity of the waste heat is about 1 ton of water per ton of coal carbonized. In addition, there is surplus gas of about 2000 to 2500 c.ft. per ton. In regenerative ovens the waste heat is extracted from the burnt gases in the regenerators. There is, however, surplus gas of from 4500 to 5000 c.ft. per ton, having an average calorific value of 500 B.Th.U. per c.ft.

Utilization of the Waste Heat and Gases.

(1) *Regenerative Ovens.*—The surplus gas can be:
- (*a*) Burnt under boilers for steam generation.
- (*b*) Used in gas-engines connected with electrical generators.
- (*c*) Used for town lighting purposes.
- (*d*) A large amount can be utilized for tar distillation plants, &c., connected with the bye-product ovens.

In the past gas-firing under boilers has proved to be extremely wasteful, only about 55 to 60 p.ct. on an average of the heat being utilized. With proper treatment, design of boilers, the design and installation of suitable burners for correctly regulating and proportionating the air supply to ensure complete combustion, and the installation of superheaters, economizers, or air preheaters, an efficiency of about 70 to 75 p.ct. could be maintained. In boilers specially designed for gas firing, and not adapted to coal firing in any way—as, for example, the Bonecourt boiler—efficiencies of 90 p.ct. can be obtained. For small installations the gas-engine is the more efficient; but for big installations the steam-turbine takes first place. The capital outlay is less, less floor space is required, there is greater freedom from breakdown, and smaller running costs. Up to the present the gas-engine has not been built on anything like the same scale as the steam-turbine. The future may, however, see rapid strides in the evolution of the big gas-engine. Its thermal efficiency is certainly higher than that of the steam-engine. Fuel economy is, however, not altogether a question of thermal efficiency. Capital costs, easy working, &c., have to be considered, in addition to thermal or mechanical efficiency.

So far as the utilization of coke-oven gas is concerned, it is more economical to utilize the gas in gas-engines than in gas-fired boilers for power production purposes. But huge economies are effected by centralization of plants of all descriptions. Hence for a number of batteries which are erected in close proximity to each other, it would be more economical under the present conditions of gas-engine manufacture to burn the gas under boilers, and utilize the steam generated in steam-turbines. This is more apparent when boilers such as the Bonecourt are used, instead of ordinary boilers.

These remarks are borne out by a consideration of the following calculations:

Case 1.—Gas from a battery of regenerative ovens built under ordinary boilers. Steam utilized in steam-turbines having a consumption of 12 lbs. per H.P. hour at or near full load. Assume that the gas has a calorific value of 500 B.Th.U. The available quantity of gas is 4500 c.ft. per hour. Efficiency of combustion is 70 p.ct.

Available B.Th.U. per ton of coal coked . . .	= 2,250,000
Amount imparted to steam	= 1,575,000
Quantity of steam evaporated, assuming that 1160 B.Th.U. are required per lb. of steam .	= 1358 lbs.
Available H.P. hours.	= 113
H.P. per hour from 1 ton of coal, if the period of coking is assumed to be 30 hours.	= 3·8
If the battery cokes 100 tons per hour, then the available H.P. per hour	= 380

Case 2.—Bonecourt boilers used having a minimum efficiency of 85 p.ct. Then the available H.P. per hour would be equal to 461.

Case 3.—Gas used in gas-engines which require a maximum gas consumption of 12,000 B.Th.U. per H.P. hour.

Available H.P. hours = 627.

From the preceding calculations, it is evident that the gas-engine is the more economical method for utilizing the oven gas.

Case 4.—Concentration of a number of batteries of ovens, so as to provide power for (say) a 5000 K.W. generator having a guaranteed consumption of 10·2 lbs. of steam per K.W. hour, or 7·6 lbs. per H.P. hour. Bonecourt boilers installed. Then the available H.P. (assuming that on an average about 8½ lbs. of steam would be required) would equal approximately about 610 from a battery carbonizing about 100 tons per hour—that is, equal to 817 K.W. To supply sufficient steam for a 5000 K.W. steam-turbine, the gas from a number of batteries of ovens carbonizing about 7000 tons per hour would be required. But in comparison with small gas-engines for individual batteries, a huge capital outlay would be saved, running costs greatly reduced, labour costs greatly reduced, and the economy effected would be much greater, since the turbine could be kept running more near to the full load than the individual gas-engine would be.

More Efficient Use of the Coal at Present Being Utilized for Domestic Fuel.

At the outbreak of the war, practically 40,000,000 tons of raw coal were being utilized for domestic purposes per annum. This coal is in the greatest majority of cases burnt in open grates in the most wasteful manner. The volatile matter contained in the coal from which the valuable bye-products are derived is burnt off, producing nothing more useful than flame and smoke. The perfecting and advance of low temperature carbonization processes, and the introduction of legislation, would result in the largest percentage of this 40,000,000 tons, most of which is of a good volatile content, being subjected to a process of partial distillation.

Gasification of All Coals.

At the present time, there is very little to choose between the best and most efficient systems of gas-producers and gas-engines and coal-fired boilers and steam-turbines, from thermal considerations. The coal consumption to produce a shaft horse-power in each case has been estimated to be about 1 lb. It therefore resolves itself into a consideration of capital costs, &c.; and it is here that the steam-turbine has the advantage, since it can be built on a big scale, and the larger the size of the turbo-generator the more efficient and the more economical it becomes. Gas-engines cannot be erected on anything like the same scale as turbo sets.

While for sizes up to 1000 KW. the gas-engine may be more economical than the steam-turbine, yet the comparative costs of the respective installations show to the disadvantage of the gas-engine. At the outbreak of the war, a steam-turbine could be put down for about £11 per KW., so that a 1000 KW. turbine plant would cost £11,000. A gas-engine would cost anything from £17 to £20 per KW., so that a 1000 KW. gas-engine set would cost from £17,000 to £20,000. The steam-turbine is also more reliable than the gas-engine. The space occupied is less; and the cost of oil, waste, upkeep, and repairs is less. The turbine can also take an overload far better than the gas-engine. The continuous improvement of the gas-engine will, however, in time prove it to be a formidable rival to the best reciprocating steam-engine and steam-turbines for comparatively large outputs.

While the question of the economical gasification of all coals is open to much doubt, there is certainly a wide field for the use of gas-producers in gasifying inferior fuels. There are at present many seams of coal being unworked, due to the inferior quality of the coal. This inferior coal could be efficiently dealt with in gas-producers and the gas, when cleaned, &c., utilized for heating coke-ovens, used in gas-engines, or in gas-fired boilers for steam-raising purposes.

Small coals unsuitable for coking can be gasified. Also inferior qualities of coke and smokeless fuel. There are several producer plants designed especially for gasifying bituminous slags, &c., and for extracting bye-products from the gases produced. Hence in the Mond gas-producer installation from 70 to 90 tons of sulphate of ammonia is recovered per ton of fuel gasified. Coke, &c., can be utilized far more efficiently in the gas-producer than under the steam-boiler.

The problem of the gasification of all coals will undoubtedly be well thrashed out in the near future. Meanwhile, in the interests of fuel economy, every possible means should be adopted for raising the efficiencies of every type of steam plant to as high a value as possible.

Gas in Motor Vehicles.—The Board of Trade give notice that the Gas (Use in Motor Vehicles) Local Prohibition Order, 1918, ceased to have effect as from Monday of last week, the 18th inst.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Further Parting of the Ways.

SIR,—You have given in your foot-note to my letter the only possible answer to my question as to the manufacture of water gas; and I think I can anticipate that that of my friend Mr. Harry Jones would be no less emphatic.

What then is the explanation of the suggestion in your leader and his letter that the acceptance of the Beilby report by the South Metropolitan Company has anything whatever to do with the fact that it only makes coal gas? On the contrary, a lower percentage of inerts is producible in the every-day practice of water-gas manufacture than is customary with coal gas. No one knows this to be the case better than Mr. Jones, with the exception, perhaps, of the Editor of the "GAS JOURNAL."

But has some non-technical person been setting up a smoke screen of water gas, in order to obfuscate the authorities in an endeavour to explain why only the South Metropolitan Company could commercially comply with the Beilby limitation as to inerts?

Has the question of water gas been imported into the controversy by Mr. Jones, who is nothing if not a real sport, and by you, Mr. Editor, who are not less steadfast in your friendships, in order to back-up some weaker brother, who has made a *faux pas* arising out of his lacking guidance on a subject of which he did not possess any technical knowledge whatsoever? We could, indeed, all sympathize with his exclaiming under the circumstances, as did Mr. Lloyd George in the matter of the police trouble, "Why wasn't I told about this?"

If I had a water-gas plant, and was unable to work it *de die in diem* to produce something like half the inerts allowable under the Beilby report, I would promptly call in Messrs. Humphreys and Glasgow to teach me how to do so.

This brings me to the real root of the inerts difficulty. I have never had any business relationship with Messrs. Humphreys and Glasgow; but I have had many opportunities, since their early work at Beckton and at Liverpool, of admiring the thoroughness of their methods, and the scientific attributes of a system of gas manufacture which, to a greater extent than anyone, they have done so much to develop. Their engineers have not made their goal simply one of low labour costs, but they have included in it the utilization to the highest degree, of the thermal values of their raw materials, and have then taught their customers how to achieve their guarantees in everyday practice.

If I may leave out the recent applications of the vertical retort principle, I find no parallel to this in the coal gas side of the industry. From this defect, it is very largely suffering to-day.

Were I not more or less upon a holiday, ruffled only by a breath of air purporting to be easterly, but which I know is wafted from a source blowing happily only southerly, I should be tempted to elaborate this theme. For the moment, I would only express my belief that the industry badly needs similar guidance in regard to its coal-gas plants as it already possesses with water gas.

During the war, it loudly asked for such a report as that with which it is now faced. You, Sir, pointed out this possibility in clear and unmistakable terms. Let it then accept in a good spirit what is bound to be a strong incentive to put its house in order, to use its plants intelligently, whether they be for coal-gas or water-gas production, and to remember that the virtue attributed to Cæsar's wife may not be unhelpful incorporated with the business of gas supply.

CHARLES CARPENTER.

South Metropolitan Gas Company, Aug. 23, 1919.

[Nowhere in the editorial article referred to by Dr. Carpenter is the suggestion made that the complete acceptance of the Beilby report by the South Metropolitan Gas Company is due to the fact, *per se*, that it only makes coal gas; and therefore there was no such absurd indication by us that the making of water gas and its mixture with coal gas, would boost-up the percentage of inerts. As Dr. Carpenter is on holiday, and may not have the "JOURNAL" at hand containing the article alluded to, let us repeat the words we then used: "In regard to inerts and sulphur reduction, it has, as has been previously said, taken the South Metropolitan Company *years to build-up its system and attain its present refinements;* so that to-day, making only coal gas, it finds itself in the position—peculiar to itself—to comply in every detail with the report of Sir George Beilby and his colleages. The gas industry generally cannot afford the time nor the money to place itself in the same position; and, if it could, Mr. Jones well expresses the feeling that is dominant throughout the gas profession when he says that the 'restriction to so low a standard of inerts and to sulphur limitation cannot be effected without extra cost, which will represent more to the consumer than they are worth.' Liberty and elasticity are required in an industry dealing with such a large proportion of the country's chief raw material; refinements can be bought too dearly—not only to gas consumers, but to the country as a whole." Perhaps we might have left out the words "making only coal gas." But we think the quotation is sufficiently explicit to most impartial intelligences in the gas industry for it to be generally seen that our point was that it is the processes of refinement which it has built up, and not the fact that it makes coal gas only, that has placed the South Metropolitan Gas Company in a position "peculiar to itself." Water gas is not mentioned in this connection.—ED. G.J.]

The Junior Gas Associations and their Value to the Industry.

Sir,—The importance of good technical and business training in matters concerning gas engineering and distribution is recognized as having a great bearing upon the efficient conduct of undertakings; and, as you are aware, a scheme is at present under consideration to bring certain examinations up to date and more in keeping with modern requirements. The Junior Gas Associations have an educational value, and are helpful in this respect; and the advantages of membership—especially to the younger gas men—must be apparent. I am writing more particularly on behalf of the London and Southern District Junior Gas Association, whose 1919-20 session commences in October next, during which it is anticipated the programme will be of technical interest and quite in keeping with the standard set up previous to the war.

The senior members of the industry realize and appreciate, I believe, the sterling work done by the junior organizations, and recognize that membership is to some extent proof of earnestness of purpose, and a desire to qualify for the more important positions open to those who merit them. The reading of papers and (what is perhaps as important) the discussions arising therefrom, and exchange of views, together with visits to works, factories, and industrial centres, exercise a broadening influence and are intellectually enjoyable. It is not too much to ask, therefore, that engineers, managers, and others in administrative positions will point out to those constituting their staffs the advisability of connection with one or other of the Junior Associations—urging membership, encouraging the preparation and reading of papers, and the granting of facilities for attendance at meetings and visits.

Saml. B. Chandler, President,
London and Southern District Junior Gas Association.

Lower Sydenham, Aug. 20, 1919.

Carbonizing Results at Dundee.

Sir,—With reference to the paragraph appearing in the "Journal" for Aug. 5, headed "Steaming in Verticals—Excellent Results at Dundee," our attention has been called to the apparently high percentage of O_2 in this gas. The figures given by you read 2 p.ct. instead of 0·2 p.ct. As the previous figures were rather misleading, we should be glad if you would kindly correct this discrepancy.

Woodall-Duckham Co., Ltd.

Thanet House, W.C., Aug. 22, 1919.

Gas-Works Fire Insurance.

Sir,—The increased cost of building has made the question of insurance against fire a matter of consideration. The materials of construction of gas undertakings are of so incombustible a character that the contingent risk is not comparable with that attached to factories; but the insurance companies do not make any corresponding allowance in the amount of premiums. Seeing that so large a portion of the fabric is practically indestructible, is it usual, may I ask your readers, for gas companies to insure up to the full value of bricks and mortar, or to take some part of the risk by underestimating the gross value, or even by taking upon themselves the whole of a very remote responsibility?

B. H.

Aug. 22, 1919.

Tar Distillation Profits.

Sir,—Mr. Leather, in his reply to my letter in your issue of Aug. 12 states: "The receipts of £5756 applies to the year's production of 2711 tons." If so, I make £5756 divided by 2711 to be equal to 42s. 6d. and not 41s. 6d. as stated in the report.

My sole object in writing was to point out that the result of distilling 3180 tons of tar at Burnley was equal to 36s. 2d. per ton of tar distilled.

Interested.

Aug. 22, 1919.

REGISTER OF PATENTS.

Destructive Distillation and Carbonizing of Pitch.

No. 129,091.

Perkin, F. M., of New Oxford Street, W.C., and Nitrogen Products and Carbide Company, Ltd., of Old Broad Street, E.C.

No. 10,759; June 29, 1918.

Hitherto no successful process has been devised, say the patentees, for the distillation and carbonizing of pitch, principally on account of the difficulty in providing suitable apparatus. Attempts have been made by using brick ovens in the form of muffles and fire-clay retorts; but such attempts have not been commercially successful, as the liquid pitch is absorbed by the material employed, and ultimately leaks through, causing the disintegration of the retorts, while cast-iron stills and retorts are not successful above 600° C., which temperature is not nearly high enough for the production of carbon residue of the quality required. It has also been proposed to distil bitumen by first placing it in a cage or basket suspended within a moderately heated retort, in which cage the bitumen is melted, and from which it drops into the lower and much hotter part of the retort, where the distillation process is completed.

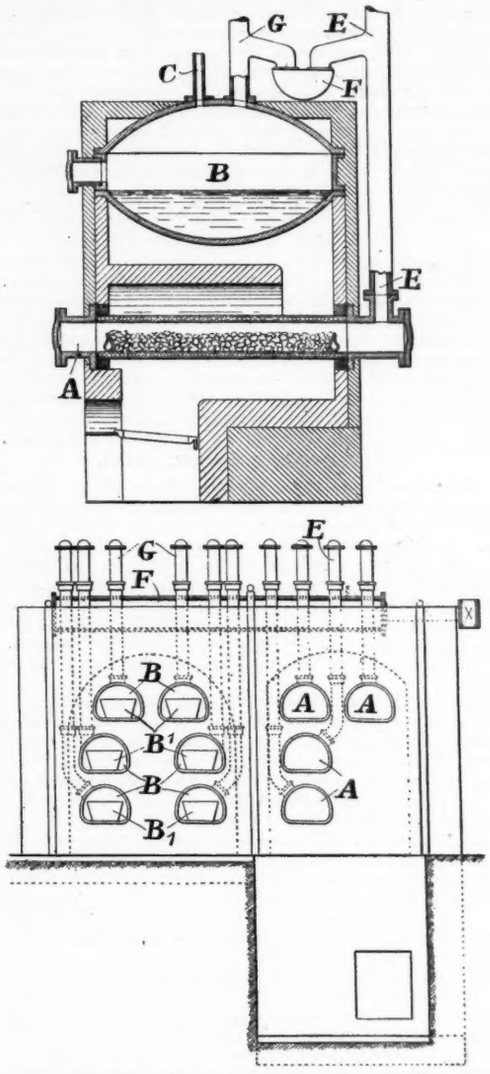
The present invention consists in a process for the destructive distillation and carbonizing of pitch, according to which the pitch is reduced to solid coke in a preliminary stage carried out at a comparatively low temperature; the operation being completed in a second and independent stage carried out at a much higher temperature at which ordinary gas-retorts in the ordinary gas-works settings may be employed.

The accompanying illustrations show two convenient forms of the apparatus.

In the first one, horizontal retorts A are built upon the ordinary gas-works principle and in the usual settings; and above them are provided iron stills or retorts B of oval shape, provided with charge and discharge doors and the inlets and outlets necessary for the material operated upon and for the products. The upper stills are used for the first stage of the process, which is preferably carried out at a temperature not exceeding 600° C.; the pitch being run into the retorts in a liquid or semi-liquid state through the inlet C, or inserted into the retorts and heated therein until it assumes a liquid or semi-liquid condition.

The retorts A are provided for the second stage of the operation to be carried out at a temperature of 900° to 1000° C. The pitch in the first stage is reduced to solid coke, containing some volatile matter. This is then removed from the preliminary stills and placed in the high-temperature retorts in which the operation of carbonizing is completed, and the last traces of volatile matter driven off.

If ordinary horizontal gas-retorts be used for both stages, as in the second arrangement shown, there would be inserted in the low temperature retorts B, stout iron trays B^1 about 10 in. in depth, with a small clearance between them and the sides of the retorts.



Perkin's (Nitrogen Products Company) Pitch Distillation Plant.

In any modification of the invention, the high ascension pipe may be replaced by a short bend connected with a long air condenser E, which passes one or more catchpots F arranged to collect the oils produced in several fractions—such catchpots being in communication with outlet pipes G from the preliminary retort or retorts.

It is found that towards the end of the operation resinous matters separate-out, and may be separated from the bulk of the oil; while the main fraction of the oil sets to a mass of the composition or consistency of heavy axle grease. During the distillation, gas is evolved in quantities depending upon the temperature at which the operation is conducted; while the oil may be redistilled, and the oils produced therefrom may be separated from any solid matter contained therein and used for fuel, lubricating, or other purposes.

As the process in accordance with the invention is carried out in two or more operations, the last of which is at a comparatively high temperature, the amount of volatile matter left in the final coke product will, it is said, be very low, with the result that the coke will be found to be an excellent material for use in the manufacture of carbons for electrodes, while the process also results in the production of a very high yield of valuable fuel oils, ammonia, and other bye-products.

Treating Coal-Tar Pitch and the Like for the Production of Fuel.—No. 129,393.

S. PEARSON & SON, LTD., SMITH, J. S., and HACKFORD, J. E., of Parliament Street, Westminster.

No. 6280; April 13, 1918. No. 8470; May 21, 1918.

This invention has reference to apparatus for the treatment of coal-tar pitch and the like for the production of liquid fuel—"enabling the pitch or the like to be treated quickly and easily with comparatively little labour."

A charge of coal-tar pitch or of a coal product is heated in a retort or still to a high temperature (750° C. or thereabouts) in the combustion chamber of the apparatus hereinafter described; and the temperature is maintained until the bulk of the vaporizable constituents have been driven off—for example, for eight hours from the time of starting with a cold retort. The combustion chamber temperature is raised to, and maintained at, about 850° C. for about two hours or more, after which combustion in the furnace may be stopped and the heat in the brickwork allowed to complete the distillation of any vaporizable constituents that may remain—coke being left. The temperature is usually raised from about 750° C. somewhat rapidly, as this tends to promote cracks in the thin skin of the coke formed at the bottom of the retort, "through which cracks the supernatant softer material flows into direct contact with the retort surface, thus causing a renewal of the vigour of ebullition." When the temperature is increased to about 850° C., superheated steam is introduced into the retort to assist in blowing-out or carrying-over heavy vapours and gases.

The distillate, which is passed into an air-cooled condenser, is dissolved in creosote or other solvent to render it suitable for use as a liquid fuel—the fuel "obtained being found to be practically completely combustible with known marine fuel-burning arrangements."

Apparatus according to the invention is shown to comprise a horizontal retort of cylindrical section arranged in a combustion chamber so that its ends project through the walls and are provided with doors; a ram actuated by compressed air or other motive power in any convenient manner, so as to enter the retort at one end and force the coke out of the other; a condenser for dealing with the distillate; and (it may be) means for preheating the charge before it is passed into the retort. Usually the plant comprises a number of retorts set in batteries of (say) four retorts; the coke discharging ram being arranged to serve one or more of the batteries and the condensing plant receiving vapour from all or some of them.

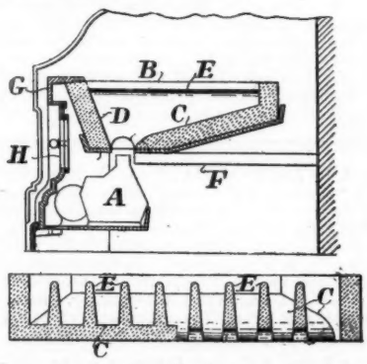
The patentees claim: (1) In the production of a liquid fuel comprising the distillate of coal-tar pitch, coal, coal products, or the like, and creosote or other suitable solvent, heating the retort or still to a temperature corresponding to about 750° to 850° C. in the combustion chamber of the apparatus. (2) Maintaining the temperature for about eight hours from the time of starting with a cold retort, and then raising, preferably rapidly, the combustion chamber temperature to, and maintaining it at, about 850° C. for about two hours. (3) A ram actuated by compressed air or other motive power in any convenient manner so as to enter the retort at one end and force the coke out of the other; and a condenser for dealing with the distillate, wherein the retort is suspended within the combustion chamber, the enclosing walls of which do not support any part of its weight.

Gas-Fires.—No. 129,908.

FLETCHER, RUSSELL, & CO., LTD., and BANKS, W., of Warrington.

No. 19,657; Nov. 28, 1918.

This invention has for its object to provide a base especially applicable for use in converting a coal-fire to a gas-fire. The base occupies a substantially horizontal position, and is of dished form, with a bottom rearwardly inclined relatively to horizontally disposed ribs which extend from front to back and divide the base into a number of substantially horizontal transverse passages or channels.



Banks' (Fletcher, Russell, & Co.) Gas-Fires.

A transverse section is given through a gas-fire fitted with one form of such a base, in accordance with the invention, and a cross section.

A is the burner and B a base of fire-clay arranged above it. The burner rests on brackets connected to lugs projecting from a lower cross-member which connects the side pieces or cheeks. The base is of dished form, with its bottom C inclining towards the back, its front D inclining forwardly, and its sides converging rearwardly. The interior of the base is divided by ribs E into a number of substantially horizontal transverse channels into which (immediately behind the front) the flames from the nozzles of the burners pass through openings. The ribs terminate short of the top of the base, and are arched in line with the openings. The base rests on the bottom bars F of the coal fire-grate, so that its top is horizontal, and the front wall fits below the horizontal flange of an upper cross-member G connecting the side cheeks. When the base is made of fire-clay or like material, it is preferably mounted in a metal tray which, in the event of it cracking, keeps the pieces together and prevents them falling apart.

The radiants [not shown] are piled on the ribs E, and "give the appearance of a coal-fire, the resemblance to which may be increased by blacking the radiants or the upper layer thereof, or some of same."

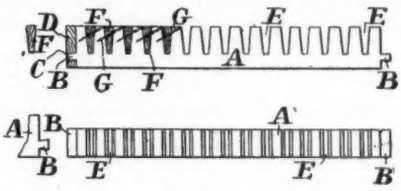
An air-regulator H, of the sliding hit-and-miss type, is preferably provided between the upper and lower cross-members. The channels formed by the ribs E have, it is said, a "flue-like action on the flames from the burner nozzles, which causes the flames to pursue a rearwardly inclined course and heat the whole mass of radiants instead of passing vertically through the mass at the front."

Grids for Gas-Purifiers.—No. 129,885.

SPENCER, J. A., of Southall, Middlesex.

No. 17,015; Oct. 18, 1918.

According to this invention, the framework of the grid for supporting the customary V or tapered longitudinal bars is so recessed that, on being fitted together, the pieces become automatically interlocked ready for receiving the longitudinal bars, which, on being placed therein, completes the grid ready for use.



Spencer's Gas-Purifier Grids.

Two or more cross-pieces or bars A are arranged a suitable distance apart. Their ends have dovetail or plain tenon projections B, which fit corresponding mortise holes or recesses C in side pieces or stretchers D. The tenons of the end cross-pieces are flared and fit corresponding mortise holes or recesses in the ends of the stretchers, while the tenons of the central or inner cross-pieces are plain, and fit corresponding holes in the stretchers. A series of taper recesses E, corresponding with the longitudinal laths or bars F for supporting the oxide within the purifier, are also formed in the cross-pieces.

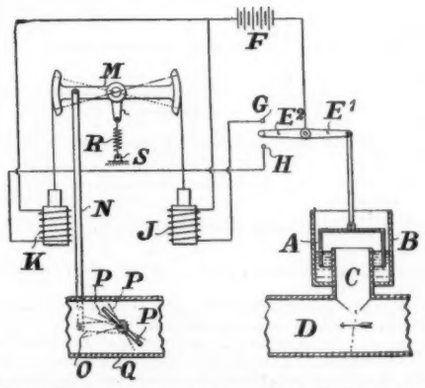
In building the grid, the tenons of the central cross-piece or cross-pieces are first fitted in the holes in the side stretchers, and upon similarly placing the flared tenons of the end cross-pieces into their respective holes or recesses in the stretchers, the framework becomes interlocked ready for receiving the longitudinal bars F, which may now be fitted in the customary manner. These bars and the end cross-pieces A are prevented from shifting their position by the pins G, which are driven in an oblique direction through both cross-piece and bar.

Regulating the Pressure in Gas-Mains.—No. 130,106.

SIMON-CARVES, LTD., and PRESTON, J. T. E., of Manchester.

No. 6812; April 23, 1918.

According to this invention, a sealed floating bell, piston, or diaphragm, normally sustained by the pressure in the gas-main and operated by (or adapted to operate under) variations of pressure, actuates in its movements a rocking lever controlling the circuit through a pair of solenoids provided with cores, which, on the energizing of their solenoids, operate in one direction or the other a quadrant, which, in turn, operates a valve situated in the main or in an orifice or passage through which the gas drawn off passes, so as to increase its effective area with an increase in the generation of gas and pressure in the main, and to reduce the effective area with a decrease in the generation of gas and pressure.



Preston's (Simon-Carves, Ltd.) Gas-Main Pressure Regulator.

In the embodiment of the invention illustrated, a bell A floats in an oil-seal B over the end of a branch C from the gas-main D, which opens into the interior of the bell so that the latter is sustained by the

pressure in the main. The bell is connected to one arm E^1 of a rocking lever, while the other arm E^2 of the lever is connected to one terminal of a battery F, and is adapted to co-act with a pair of contacts G H to complete the circuit through one or other of a pair of solenoids J K, which are connected to the other terminal of the battery in parallel, and to the contacts G H respectively. The solenoids are provided with cores connected to the arms of a doubled-armed quadrant M, which, in turn, is connected, by the link N and lever O, to a valve P situated in an orifice or passage Q, through which the gas is drawn off from the main by the usual exhauster.

Normally, the arm E^2 of the lever does not engage either of the contacts G H, neither solenoid is energized, and the valve P is partially open to a predetermined extent (as shown in full lines). In the event of the generation of gas and the pressure in the main falling below the normal, the bell A falls and rocks the lever, so as to cause the arm E^2 to engage the contact G and close the circuit through the solenoid J. On the energizing of this solenoid, its core is pulled down, and operates the quadrant M into the position indicated in dotted lines, which (through the link N and lever O) partially closes the valve P, as also indicated in dotted lines—thus reducing the effective area of the passage Q and, consequently, the quantity of gas drawn off. If, on the other hand, the generation of gas and the pressure in the main D should rise above the normal, the bell rises and operates the lever, so that its arm E^2 engages the contact H and completes the circuit through the solenoid K. The core of this solenoid is then pulled down and operates the quadrant M into the position indicated in dot-and-dash lines, to further open the valve P, as also indicated in dot-and-dash lines, to increase the effective area of the passage Q and permit a greater quantity of gas being drawn off by the exhauster until the pressure in the main again reaches the normal.

The valve is loaded (by weight, spring, or other appropriate means) so that when the circuits through both solenoids are broken, either on normal conditions again obtaining after the valve has been partially closed or further opened, or in the event of failure, the valve assumes its normal partially open position. Conveniently, the quadrant M may be furnished with a central arm whereto is connected one end of a spring R, which has its other end connected to a fixed point S and which brings the quadrant, and thereby the valve, to, and maintains it in, normal position when the circuits through both solenoids are open.

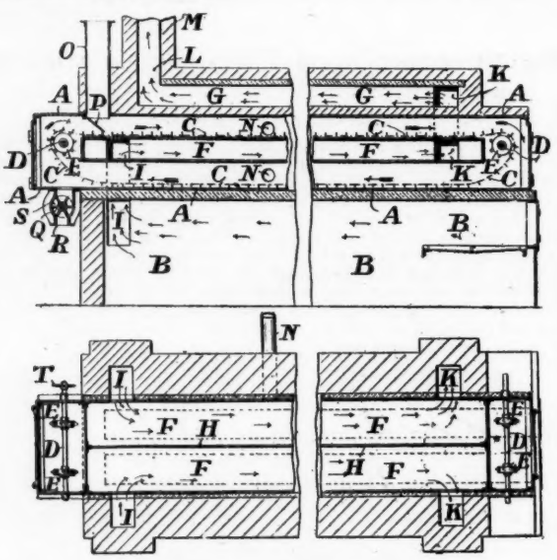
Mechanical Retorts or Heating Chambers.

No. 130,175.

PHILLIPS, T., of Bideford.

No. 12,846; Aug. 8, 1918.

This invention relates to apparatus in which the material to be treated—wood shavings, sawdust, peat, and the like—is passed through the retort by an endless travelling scraper, in some cases moving along the top of a flue divided into two longitudinal compartments communicating with the furnace flue of the retort. The invention comprises in the first place, in addition to the scraper flue, a flue located over, or in the top of, the retort communicating at the furnace end with the scraper flue and at the opposite end with the chimney; the scraper flue also communicating at the feed end with the furnace flues of the retort.



Phillips's Mechanical Retort.

A longitudinal section and a plan in section show the arrangement referred to.

A is the retort or heating chamber, and B are the furnace flues. C is the endless travelling scraper; D and E are the shafts and sprocket wheels supporting the scraper; F is the scraper flue; and G the flue located in the brickwork or over the top of the retort.

The sides of the flue near the feed-end are, by passages I, connected with the furnace flue, and at the other end also by passages or pipes K with the top flue G, which at the opposite end is connected by a passage or pipe L with the chimney M. N are the outlets for the gases arising from the material under treatment in the retort. They communicate with the interior of the latter and lead to a condenser. O is the feed inlet, to the lower end of which is pivoted a plate P adapted to be alternately raised and lowered by the plates projecting from the scraper C, and thereby agitate and evenly distribute the material fed on to the scraper in accordance with the speed at which the endless feeding band travels.

The discharging means consist of a roller Q rotatable in the outlet R of the retort and having peripheral pockets S adapted to receive and discharge the treated material at regular intervals. The blades of the scraper each have recesses formed in their edge so disposed that the recesses of one blade are covered by the parts of blade between the recesses of the adjacent blade. Thus the material fed on to the scraper will be continuously agitated and evenly distributed on the flue below.

The discharge roller would be driven from the shaft of the scraper sprocket wheel T by means of a chain U.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Aug. 20.]

Nos. 19,658 to 20,224.

BURY, E.—"Recovery of valuable products from gases evolved in destructive distillation of coal, shale, &c." No. 20,157.
CHESHIRE, W. D.—"Proportional gas-meters." No. 19,848.
DIXON, L.—"Gas-burners." No. 19,855.
EVANS, E. V.—"Purification of benzol, &c." No. 20,217.
GENERAL GAS APPLIANCES, LTD.—See Dixon. No. 19,855.
HOLLINGS, H.—See Evans. No. 20,217.
HONETSCHLAGER, G.—"Ignition system for gas-engines." No. 20,073.
KELLY, J.—See Honetschlager. No. 20,073.
LAMPLOUGH, F.—"Conversion of heavy hydrocarbons into lighter hydrocarbons." No. 20,132.
LARKIN, L.—"Universal expansible pipe couplings." No. 19 932.
MILNE & SON, J.—"Gas-burners." No. 19,846.
PARKINSON AND W. & B. COWAN.—See Cheshire. No. 19,848.
RAMBUSH, N. E.—"Removal of sulphur from gases." No. 19,702.
SKINNINGROVE IRON COMPANY.—See Bury. No. 20,157.
SOUTH METROPOLITAN GAS COMPANY.—See Evans. No. 20,217.
STANIFORTH, H.—"Gas-burners." No. 19,846.
STENNING, G. A.—"Generation of producer gas." No. 20,028.
SYNTHOL, LTD.—See Lamplough. No. 20,132.
WEIPPERT, E. D.—See Cheshire. No. 19,848.
WELLS, E. S.—"Portable gas heating stove." No. 19 970.
WELLS, J.—"Gas production for mechanical traction." No. 20,119.
WHITFIELD, C.—"Gas-heated stoves." No. 19,967.
WOOLGAR, A. D.—See Larkin. No. 19,932.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

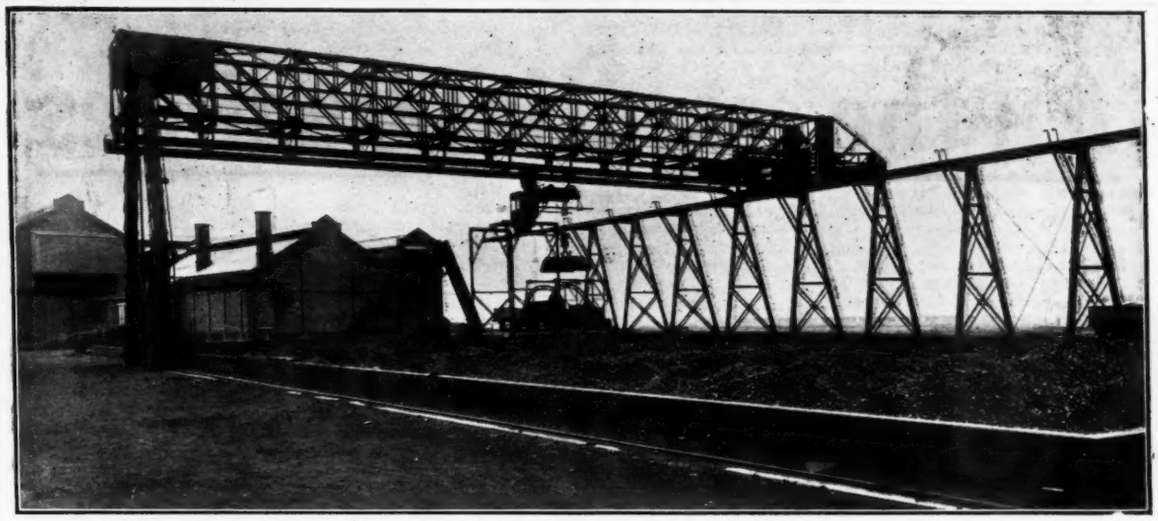
Greenwich Fuel Research Experimental Station.

Lieut.-Colonel BURGOYNE asked the Prime Minister what progress had been made to date in connection with the Government experimental fuel research station at Greenwich; what amount of money had been expended in connection therewith; and whether any results had been obtained towards the utilization of inferior coal and colliery waste which would tend to increase the amount of domestic and industrial fuel, solid and liquid, for public distribution and consumption during the coming winter months.

Mr. H. FISHER, who replied at the request of the Prime Minister, said the laboratories at the fuel research station were completed and had begun work. The main building would, it was hoped, be completed next month. The recorded expenditure up to the present on buildings and equipment was £130,924, and it was estimated that the cost under these heads would be £193,588 when the station as at present planned was finished. It had not yet been possible to conduct experiments bearing on the last part of the question; but they would be undertaken in due course, after the station was complete.

Buckhaven to Acquire the Leven and Wemyss Gas-Works.—According to the "Dundee Advertiser," authority has been secured by the Burgh of Buckhaven to proceed with the acquisition of Leven and Wemyss Gas-Works, the negotiations for which were suspended in 1914. More than local importance attaches to this purchase, says our daily contemporary, as both the supplying Companies have their works situated outside the burgh—Leven serving Innerleven and Methil; while Wemyss serves Buckhaven and Denbeath. An interesting situation may arise if the Leven Town Council proceed further in their gas municipalization proposals.

Winchester Water and Gas Company.—The half-yearly meeting of this Company will be held on Thursday, when the Directors will report that the balance of net revenue account available for dividend is £9378. The Directors recommend the payment of a dividend on the preference stock at the rate of 4 p.ct. per annum, and on the consolidated ordinary stock at the rate of 4¼ p.ct. per annum (less income-tax) for the half year to June. Owing to the advance of wages, the Directors found it necessary to increase the price of gas as from Ladyday last by 5d. per 1000 c.ft.; but they point out that the increase in price since 1914 is less than 24 p.ct., while the wages and the cost of coal are now more than double. The difficulty with regard to the coal supply has been aggravated by the recent strike of miners in South Yorkshire—the district to which the Company has been looking for the major portion of its coal supplies.



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MISCELLANEOUS NEWS.

CROYDON GAS COMPANY.

The Ordinary Half-Yearly General Meeting of the Company was held on Friday last at the Offices, Katharine Street, Croydon—Mr. Charles Hussey, J.P., in the chair.

The Secretary (Mr. W. W. Topley) read the notice calling the meeting; and the Directors' report and the statement of accounts were taken as read.

Difficulties of the Position.

The Chairman, in moving the adoption of the report and accounts, said that since the proprietors met in February, the armistice of November last had been followed by a settlement of the terms of peace. Warfare was over, they might hope, save for some echoes from distant parts; and the nation had become free to face without distraction the problems with which it, in common with the whole of Europe, was confronted. These were formidable enough to need all their energies, and the most complete co-operation of all classes; but unfortunately the war had left the country with a legacy of unrest which would make the common task more difficult than it need be. In part the difficulties were no doubt due to the reaction from war strain, which affected them all; but unfortunately there was far too much needless antagonism and mutual suspicion between various sections of the community, whose real and pressing need was to work together loyally to repair the injury done by the war to our economic life, before the injury became irreparable. Could all classes but sink their differences and pull together in the way he was glad to believe they were doing in the gas industry, the outlook would be brighter than it seemed to be at the moment. There did appear to be signs that wiser counsels might prevail among the mass of the workers of the country, and that those who sought to first arouse class antagonism, and then exploit it for revolutionary ends would not, in this country at least, meet with the success they anticipated.

Gas Business Prospects.

Naturally one of the first subjects to which they as gas stockholders would turn attention was as to what were the prospects under the new conditions of maintaining and extending the primary business—the sale of gas. It would have been seen from the report that for the past half year they had to record a small decrease in consumption—less than ½ p.ct. But this was no true measure of the outlook as he viewed it. In fact, in the latter part of the half year, when restrictions on the use of gas were somewhat relaxed, there was a considerable increase in output; and this had been, and was being, fully maintained, while the Sales Department had in hand more orders than it could deal with. In proof of this only that day they had had a report from the Engineer, showing that up to the present this quarter they had had an increase of 10½ p.ct. The tendency, in fact, might be regarded as being towards a rapid increase, held in leash only by the restrictions that still remained, and by the difficulties that still beset them in regard to obtaining materials and skilled labour. Even so, they had to record a satisfactory increase in the number of consumers and of the appliances in use. Temporarily, they had been obliged to cease taking orders for the hire of heating stoves, as those in hand were growing to unmanageable proportions. It might be of interest to note that arrangements were being made to permit of the resumption of high-pressure lighting in the coming autumn and winter, if circumstances permitted of this being done.

The Claims of Electricity.

During the latter part of the war great publicity was given in official reports to the claims of electricity; and a good deal of public misconception was caused as to the proper place of this form of energy in our national economy. That it had a great and important part to play in our future national life, no one wished to deny. He least of all. But many of the claims made for it had been so exaggerated as to border on the grotesque; and if they were conceded, and given effect to, the result on the fuel resources of the country would be nothing less than disastrous. With the accounts, each proprietor had received a report of a recent interview granted by the President of the Board of Trade to a deputation representing the gas industry; and he (the Chairman) would advise all who were interested in gas undertakings to read the report carefully, for it deserved close study as a reasoned and forceful statement of the case for gas. He would add to it but one illustration of the comparison of gas and electricity from the point of view of selling price as delivered to the consumer. The heat produced by the combustion of a pennyworth of gas in Croydon at the price which would be ruling in October was greater than that which could be obtained from two-and-a-half units of electricity; while 1 lb. of coal used to produce gas enabled more heat to be obtained by the consumer than did 5 lbs. of coal converted into electricity. So for the purpose of producing heat (which was also the basis of cooking) it would be seen that electricity was not within sight of being able to compare with gas, either as to cost to the user, or as to economy of the nation's fuel resources. Such a comparison as this, moreover, left altogether out of account those valuable, and indeed indispensable, bye-products obtained in the process of gas-making—tar and sulphate of ammonia.

Sliding-Scale Revision.

These considerations, he hoped and believed, would weigh with the authorities when they came to deal with the claim of the gas industry to be granted some substantial relief from the special conditions which were pressing so hardly upon it at the present time. Most of the proprietors probably knew that gas companies as a rule worked under what was known as the sliding-scale. This was devised nearly fifty years ago, in order to give shareholders and consumers a common interest in the price of gas. Each company working under this system had a standard price of gas, and a standard rate of dividend. Any rise in the price of gas reduced the rate of dividend which might be paid, and any fall in the price of gas increased the permissible dividend. The consequence was that consumers and shareholders both benefited from any improvements or economies which the management might be able to bring about; the gain of the shareholders being dependent upon the consumers having first received a benefit. In the case of this Company, the consumers gained in money about £10 to the shareholders £1. This arrangement worked to the great advantage of all parties so long as the conditions determining the price of gas were in the main the efficiency with which the companies were managed. But it was obvious that, when the price of coal and all the other expenses of a gas company increased, as they had done of late years (from causes quite unconnected with, and quite beyond the control of, the management), the whole basis of the partnership was destroyed. This Company, for instance, would be obliged to increase the price of gas by 6d. per 1000 c.ft. in October; and this would mean a reduction of 1½ p.ct. per annum in dividend on most of the stocks, while for this half year the net profits were short by £1325 of the amount required for dividends. Under conditions so unfair, it would not be possible to raise, except on exorbitant terms, the capital required to develop and extend the gas industry; and as the national importance of the industry was admitted, it must, he thought, follow that new regulations would be made in accordance with the changed conditions that now prevailed.

Fuel Rationing.

He had referred to the rationing of gas consumption. The proprietors probably knew that it had been decided by the Government that control over household fuels must be continued during the coming winter. Several important modifications, however, had been made as compared with last year. The allowances of gas to householders under last year's Order were this spring increased by 25 p.ct.; and this increase was still to be operative—the assessments of last year being, with this modification, automatically renewed for the coming year. There was also a provision that householders who did not require more than 12,500 c.ft. of gas in any quarter might have up to that quantity free of restriction. The importance of this lay in the fact that the smaller consumers (in particular most of the 24,000 odd prepayment consumers) would be practically freed from any limitation on their requirements. It was interesting to compare the summer and winter consumption of the two classes of consumers. He found that, while the ordinary meter consumers used in a winter quarter on the average half as much again as in a summer quarter, the consumption through prepayment meters was almost equally distributed through the four quarters of the year. This was due mainly to the larger proportionate use made by the users of gas for cooking. The importance of these figures lay in the fact that gas sold in the (to the Company) quiet months of the summer when they had ample plant was more profitable than gas sold in the depth of winter, when the manufacturing resources were strained to the utmost.

Freedom for Coke Sales.

One further feature of the present household fuel regulations was of interest sufficient to warrant brief reference. In regard to the sale of coke, the position now was that any householder might purchase any quantity, provided he did so from the gas company or coal merchant with whom he was registered last year. Those who took advantage of this concession, and got in a good supply during the summer (which was the desire of the coal controller) might be glad to have done so if the pinch came during the winter.

Increase of Expenditure and of the Price of Gas.

The accounts showed the comparison with last year, and spoke for themselves. The advance made in July of 6s. per ton in the price of coal, with the increase which would probably follow in prices of other materials, increases which had been made in wages, a probable increase of large extent in the railway rates of goods carriage, and the recent decision of the Coal Controller that coal should, as far as possible, be sent by sea to gas-works, would in the present half year add very heavily to the expenditure. He might here mention that all coal, on the basis of the present freights, that came by water instead of by rail cost the Company about 8s. per ton more; and the Controller had given orders that—this was the excuse—as railway trucks were very scarce, and the permanent way choked with other goods, all coal for gas-works was to come by water. The Directors only proposed at present to increase the price of gas by 6d. in October, making it in Croydon 4s. 5d. They hoped to get through the coming half year with this increase, which was small compared with increases of 8d., 10d., 1s. (and even in one case 2s.) per 1000 c.ft. made by some other companies. He might remind the proprietors that no advance in price was made by the Company in April when many other companies increased their price.

Capital Expenditure and Issues.

The proprietors had seen that during the past half year £31,000 of "D" stock was issued. Money was required to finish the new gasholder, on which work (stopped during the war) had recommenced, and for new mains which were absolutely necessary to enable an adequate supply of gas to be given to certain outlying districts. More capital would be required for these and other purposes; and as the powers which the Directors had were now exhausted, the proprietors would be asked to pass resolutions empowering them, as and when it became necessary, to exercise the remaining capital powers. This would not be done all at once, but from time to time as the money was required, and as the stock could advantageously be issued.

The Deputy Chairman (Mr. Thomas Rigby) seconded the motion, which was unanimously carried.

Mr. Charles Webb asked whether there had been any improvement in the quality of the coal supplied.

The Chairman replied that at present they were getting Durham coal which they liked; but previously they had been receiving all kinds of coal—some indifferent and some poor, and generally bad for their purposes. But of the Durham coal, they had nothing of which to complain.

Dr. Critchley, speaking of the sliding-scale, asked whether, now that the familiar rate of dividend was being departed from, the price

of gas could not be increased in order to make up the dividends to what they were—in other words, if the price of gas was increased up to the highest point allowed by their standard, could they not increase the dividend?

The CHAIRMAN replied that they could not. The standard price under their sliding-scale was 4s. 7d.; and the 6d. the Directors proposed to put on to the price of gas would make it 4s. 5d., so they had still 2d. in hand. The dividends that were being proposed were the statutory ones. Some gas companies were moving the Government to allow them to pay a higher rate of dividend, because they were only able to pay at the rate of 3 p.ct. per annum, and some lower than that. It was not considered that this was a fair remuneration for capital invested in the supply of gas for light, heat, and power.

The motion was unanimously adopted.

THE DIVIDENDS.

Mr. WILLIAM CASH moved the declaration of dividends at the rates per annum (less tax) of 12 p.ct. on the "A" stock, 9 p.ct. on the "B" and "C" stocks, 5 p.ct. on the "D" stock, 9 p.ct. on the "E" stock, and (for three months) 5 p.ct. on the £31,000 of "D" stock issued last half year. He remarked, as to the last issue of stock (which was getting dividend now for the first time for three months) that it was largely over-subscribed, for it was a first-class stock—practically a preference stock. The proprietors would be glad to know that, particularly in the town, their stocks were sufficiently well thought of to make people buy them. But they had to issue the stock at a price which was a considerable burden on the Company. Regarding the sliding-scale (under which for every increase in the price of gas the shareholders were deprived of a certain amount of dividend), gas companies, while they had the opportunity of passing on to the consumer the increased costs they had to bear, were unable to indulge in any profiteering. On the contrary, they had to reduce the distribution to the shareholders of the profits made. There was in existence the Statutory Undertakings (Temporary Increase of Charges) Act, which operated for two years, and which gave the Board of Trade power to make grants of relief in certain cases so that the dividends were not reduced below three-quarters of the standard dividend or the average of the pre-war dividend, whichever was the lower. But this Act was not of any advantage whatever to this Company, because the Board of Trade had only power to grant three-quarters of the dividend, as he had described. They would, therefore, if they made application under the Act, only get permission to pay on the "A" stock 7½ p.ct.; the standard in that case being 10 p.ct. For a Company in their position, the "relief" was perfectly ludicrous, and was no relief whatever. Steps were being taken under which, it was hoped, a greater measure of relief would be given to gas companies who were suffering from circumstances over which the Directors and officers had no control. As a result of the war, they had had to increase wages, and pay more for all materials; and the burden fell partly on the consumer and partly on the shareholder. The unfortunate shareholders, performing the useful duty of producing such a necessary article as gas, and secondary products of great value to the nation, were being penalized by a reduction of dividend. In 1913, the dividends cost in the price of gas just a little under 7½d. per 1000 c.ft.; and for the half year just completed it cost a little under 5½d.—a decrease of 2d., and due solely to the fact that the shareholders were getting this less remuneration for the capital invested in the undertaking. This was a matter which undoubtedly called for rectification, and in respect of which they hoped rectification would follow the steps now being taken. If they turned to the accounts and the working results of this and other gas companies, they got a very practical example of the importance of the question of the production of coal in this country; and, speaking for himself and his colleagues, they rejoiced to know that the Government had taken up the position (as the Prime Minister had made clear) that this country would not embark on the nationalization of the coal mines; but they were prepared to enter upon a scheme which would protect the consumers' interests, and give representation to the men very largely on the lines which obtained in the gas industry. They believed this was the proper basis upon which an industry like the coal industry might be carried on—not by adopting the system of nationalization, regarding which, so far as the ordinary man could understand, nothing had been brought forward to prove that it would be a real advantage from the national point of view.

Mr. HENRY WOODALL seconded the motion. In doing so, he said that, as a technical Director, he should like to point out the excellent provision, and the increased provision, they had made for the repair and maintenance of the works and plant. As the proprietors knew, all costs had gone up enormously; but in spite of these higher costs, they had not allowed the works or the plant to suffer in any way. The works were in excellent state; and he thought their three chief officers were also in the same condition. [Laughter.] It was very important they should be, because, in these trying times, it was a very great advantage to the Company to have gentlemen who were fit and well to carry on the great service they had to render to the Company. As to the sliding-scale, it must be obvious to all that the sliding-scale, however fair it might have been in normal times, was not fair in these abnormal times.

The motion was carried unanimously.

A SUGGESTED INCREASE OF DIRECTORS' FEES WITHDRAWN.

A resolution was moved by Dr. RODMAN, having for its intention the increase of the Directors' fees by £350 per annum as from July 1 last. The fees have not been raised since 1912; and an excellent case was shown by the proposer as to why the Directors deserved additional recompense for their services. The motion was cordially seconded by Mr. JAMES W. HELPS. But Mr. JOHN JONES and Mr. J. O. PELTON, while abstaining in any way from discussing the merits or demerits of the proposal, expressed their view that the time was inopportune for making the change. On the other hand, Mr. WEBB supported the proposal; but the CHAIRMAN intimated that he and his colleagues—while fully appreciating the kindly intentions of Dr. Rodman, Mr. Helps, and those who supported the resolution—would much rather it was withdrawn in view of the expressions of opinion as to the inopportuneness of the time for an increase being made. They felt they would prefer such a resolution to be passed unanimously. In view of the Chairman's expression of opinion, Dr. Rodman withdrew the resolution, with the consent of his seconder.

ADDITIONAL CAPITAL AND BORROWING AUTHORIZATION.

The CHAIRMAN next moved—

> That the Directors be, and are hereby, authorized, pursuant to Section 4 of the Croydon Gas Act, 1904, and to Section 19 of the Croydon Gas Act, 1905, from time to time to raise by the creation and issue of "D" stock, additional capital amounting in the whole to the sum of £186,000, inclusive of any premiums to be obtained on the sale of the said stock.

Unfortunately (remarked the Chairman) the laying of mains and the erection of a gasholder and other things, as well as the purchase of coal and materials, had increased so abnormally in cost that it required a much larger amount of capital now to carry on the same business than it did in 1913. The Directors were only now asking for power to raise the stock as and when required. The proprietors might rest assured they would not do so until they were compelled, because they recognized, as did the proprietors, that they could not issue stock under present conditions upon favourable terms. They would take the opportunity of issuing it, as the market permitted, from time to time, at the best possible price.

Mr. PERCY H. HALL seconded the motion, which was unanimously carried.

The CHAIRMAN further moved—

> That the Directors be, and are hereby, authorized, pursuant to Section 14 of the Croydon Gas Act, 1904, and to Section 29 of the Croydon Gas Act, 1905, from time to time to borrow on mortgage of the Company's undertaking, or by the issue of debenture stock (in addition to any moneys already borrowed, or authorized to be borrowed, but inclusive of any premiums to be received on the creation and issue of mortgage debentures, or debenture stock, in exercise of the borrowing powers hereby authorized) one-third part of the additional capital by the last preceding resolution authorized to be raised, and at the time actually issued by stock.

It was remarked by the Chairman that this resolution followed upon the previous one—their Acts giving them the power to issue debentures or mortgages (as the case might be) up to the amount of one-third the stock issued and paid up. He had observed in connection with the previous resolution that the cost of things was abnormally high. He might give a few comparisons which would bear out the statement he had made. Since he had been a Director of the Company, they had purchased coal, delivered on to the works, at 13s. 6d. per ton. The cost was to-day 46s. per ton. They used to purchase oil at 2¾d. per gallon; it had been 1s. 4d., and was now 8¾d. Oil was therefore more favourable than it had been. Wages had doubled; and materials in certain directions had gone up as much as 300 p.ct. All this tended to show that they had, and would have, in carrying out the same work, to spend more capital than in pre-war times.

Mr. SAMUEL SPENCER seconded the motion, which was unanimously adopted.

VOTES OF THANKS.

Mr. WEBB proposed a cordial vote of thanks to the Chairman and Directors. He was sure the proprietors would be pleased and gratified to see their Directors, who had been through these strenuous times for them, still in office when they got back to normal times. He was, however, afraid, from his survey of the position, that there was more trouble in front of the Board in common with the boards of other undertakings. They had had great anxieties in the past, they had them still, and they would have them, he feared, some time ahead.

Dr. CRITCHLEY said he seconded the resolution with all sincerity. They heard of badly managed companies paying increased dividends; but here they had a well-managed company which had found it necessary to reduce their dividends. He did not suggest this was the fault of the Board, though it was the misfortune of the proprietors. It was an anomaly that the sister industry of electricity could increase its charge without any reduction of dividend. Notices were sent out increasing the prices of electricity by 25 p.ct., and another notice followed soon after putting on 25 p.ct. more; and the total increase was now 100 p.ct., while that of gas was less than 62 p.ct. But here in the gas industry, they had these great troubles, and the dividend was reduced.

The motion was heartily agreed to.

The CHAIRMAN, on behalf of himself and colleagues, thanked the proprietors most sincerely. As to Dr. Critchley's remarks, the Directors were large stockholders; and so they suffered equally with the rest of the proprietors, and to larger extent than many. They would be only too pleased if it were possible to pay larger dividends. So long as materials, wages, and other things stood at the high figure they did to-day, it would be an impossibility to pay the dividends they used to do. It was hoped Parliament would look upon the gas industry with greater favour in the future than in the past, so that they would get something more to recompense the capital that was invested in the industry. He had much pleasure (as during many years past) in proposing a vote of thanks to their officers, staff, and employees generally. Both in high and low positions, they did their best in the Company's interests; and he could say this with still greater emphasis on this occasion, in view of the worrying times. Their officers had had a great deal to do, and had done it most assiduously.

Mr. W. J. RUSSELL seconded the motion, which was heartily carried.

Mr. A. CADDICK (Engineer and Works Manager) acknowledged the vote on behalf of all engaged in the manufacturing department. There was no doubt they would have very strenuous times in the coming winter—in fact, all gas companies would, mainly on account of the inadequate supplies of coal, which he feared would be pretty general. If they could get plenty of coal, he could count on all engaged at the works to assist him in giving an adequate supply of gas during the winter. He wished to personally express his thanks to Mr. Woodall for the kind way in which he had spoken as to the condition of the works. What Mr. Woodall had said would prove to the proprietors that,

although they had had war, and high costs of wages and materials, they had not let the works deteriorate. It was very important to keep them up, whatever the cost. If they let them run down beyond a certain stage, the extra cost of bringing them up to proper condition was tremendous.

Mr. W. W. TOPLEY (the Secretary) and Mr. W. J. SANDEMAN (the Distributing Engineer and Sales Manager) also acknowledged the votes in the names of their respective staffs.

HORNSEY GAS COMPANY.

A Favourable Half-Year.

The Half-Yearly Ordinary General Meeting of the Company was held on Friday, at No. 5, Great Winchester Street, E.C.—Mr. A. M. PADDON (the Chairman) presiding.

The SECRETARY (Mr. W. E. Roberts) read the notice convening the meeting; and the report and accounts were taken as read.

THE CHAIRMAN'S SPEECH.

The CHAIRMAN, in presenting the motion for the adoption of the report and accounts, said that for a considerable number of years in succession it had been his duty and pleasure to present a series of statements consistently favourable in their character; and those he would ask the shareholders to consider that day would, he thought, comply with the description and also have some additional points of merit. He referred particularly to the important increase in the business of the Company. During the six months under review, the sales of gas had increased by nearly 24 million c.ft.; being the equivalent of 8·4 p.ct. This increase in business had entailed only a trifling expenditure in the way of capital of some £254 for new meters, which amount would, of course, become subject to depreciation during the current period through the revenue account. The capital employed in the undertaking stood at the low figure of £464 per million c.ft. sold; but it was actually less than this, because the calculation took into account £25,000 upon which no interest or dividend was paid. On the credit side of the revenue account, it would be seen that they had sold their gas at 3s. 4d. per 1000 c.ft. This was the lowest price at which gas was at present being sold in the Metropolis. The revenue from the sales of gas, meters, stoves, and fittings had increased by £10,150, and that from the sale of residual products by £3561. With regard to the latter item, he would like to point out that, upon an examination of the working results, he found that they had succeeded in bringing from the retort-house, after the process of carbonization had been completed, some 12 cwt. of coke from every ton of coal carbonized. Nothing that he could say would illustrate more completely the excellence of the Engineer's carbonizing methods than this figure. Tar brought in 3·34d. per gallon—a figure which he hoped would be maintained in the future, and perhaps even increased. On the other side of the account, the expenditure on coal, which had averaged 35s. 5d. per ton, together with coke and oil, had increased by £8352. Carbonizing wages amounted to £3581, which worked out at 2·8d. per 1000 c.ft.; but, subject to some proper qualifications, bringing it into exact relation to the work done, it really amounted to about 2·6d. per 1000 c.ft., which was the lowest figure for carbonizing wages that he had been acquainted with for some months past. This also reflected great credit on the Engineer. Repairs, maintenance, and renewal of mains, &c., aggregated something like 1s. per 1000 c.ft.; and it might be assumed that very ample provision had been made in this regard before any attempt had been made to arrive at a profit. The repair, renewal, and maintenance of stoves stood at the low figure of 0·83d. per 1000 c.ft.; but this was due to the fact that their stoves and fittings had been rigorously written-down in the past. The net result of the accounts was that, while the Company had received £13,648 more than in the corresponding half of last year, the expenditure was £12,737 more, leaving an increase in profit of £911. From the profit and loss account, it would be seen that £11,802 was brought from the last account, to which was added £8549, the profit for the half year, and £212 for interest—making a total of £20,563. For the dividend, debenture, and other charges £7868 was required; leaving, after these appropriations had been made, £12,695 to carry to the next half-year's account, which was an increase in this respect of £893. He thought the shareholders would agree that what he had said epitomized a very favourable statement of accounts taken in connection with the troublous times in which they were working, and bearing in mind the low price at which they were selling gas. The other items of the accounts did not call for much comment. The special purposes fund account stood at nearly £10,000. The reserve fund was small; but, taken in connection with the amount carried forward, it was sufficient for the purpose. The statements as to coals, oil, and residual products were purely ancillary to the figures he had already given; but he would mention, with regard to oil, that the Engineer had only used 0·05 gallon per 1000 c.ft. during the six months under review. With these remarks, he would leave the accounts, which were so good as not to need any special pleading on his part.

He did not propose to make any forecast of the difficulties that lay before them, because it would be futile to attempt it. But there were certain matters they could control, and which demanded urgent and immediate attention. It was obvious, if they were to meet the ever-recurring charges which came upon them from time to time, they must keep their promises and the management of their concern up to the highest possible point of efficiency. There was no criticism that could be directed either against the Directors or the executive officers in this regard; but he was quite sensible of the fact that there were further economies to be obtained, and further efforts to be made. In certain directions he thought all gas companies must give immediate attention to the attainment of a higher measure of economy. In this respect, there was one very important matter that appealed to him—that was the question of coke, which in the past had been very negligently treated by gas enterprises generally. The whole treatment of coke in gas practice was wrong from the moment that it left the retort until it got into the hands of the purchaser—its transport was wrong, its quenching and cooling were wrong, its arrangement for the purposes of the consumer was wrong. There was a loss on all these details; and one could not go through any gas-works without noticing the wastage that occurred at every step of what was in principle a defective process of treatment. No doubt a good deal could be done in this direction. It was necessary to avoid the production of breeze in the works. There was no reason why coke should not become an extremely popular and economical fuel; but if the consumer could not get it in a form in which he could use it without discomfort, he did not want it. The inert and vitrous elements must be eliminated, so that when it was consumed it did not defeat the purpose for which it was used. This applied to the consumer; but it applied with equal force to the works themselves. The whole question must be carefully studied, and intelligence must be brought to bear on the treatment of coke. With regard to the sale of gas, the public were realizing in these hard times that gas was one of the greatest advantages in their possession. It saved trouble in the home, it saved money, it enabled people to get the much needed heat into their houses at a minimum of cost and with a maximum of convenience. People were realizing this for themselves; but, of course, they must be helped by instruction and information through advertisement to develop their idea of its full value to them. It seemed to be thought that this form of advertisement should emanate from a central authority that should do for the gas industry what the gas industry should do for itself; and he had sometimes been rather pained to see the methods of advertisement that had been employed to popularize the use of gas. He had seen in magazines of the meretricious order the same means adopted for the sale of gas as would be employed for the sale of sweets, cigarettes, or millinery. If their case did not demand better treatment than this, they had a very bad case indeed. It was not necessary for them to descend to the level of those who sold things at higher prices than they were worth by deceiving and tricking the public. The gas companies in their own areas should approach the public with a definite business statement of what the use of gas really meant to them at the present time.

Just one other topic he must refer to, the question of coal. It was a question that was ever before them, and was one of unceasing anxiety. He thought the position was clearing-up in some respects. The position of the miners was a tolerably clear one compared with what it was six weeks or two months ago. They had succeeded in getting from the coal industry a rate of wage in excess of what their labour was worth, or the coal industry could afford to pay; and it was perfectly obvious that the object of demanding nationalization was that this rate of wages should be maintained irrespective of the ability of the coal industry to pay it, which simply meant that, if the money could not be obtained from the legitimate business of coal, the country would have to subsidize the coal industry to enable the increased rate of wages to be paid. The Government already saw why the miners were aiming at bringing about nationalization; and he did not think it would be brought into effect. There was also the fact to be taken into consideration that there were vastly more coal consumers in the country than there were miners; and he did not think that the majority of the country would voluntarily submit to the imposition of the payment of this absolutely shameful dole to those who were in receipt of the highest standard rate of wages now obtaining, industrially speaking. There was some anxiety as to whether the gas industry would receive the supplies necessary to carry on the business of gas making; but he thought the Government should see, and particularly the Coal Controller should see, that the coal would be more advantageously supplied to those who gave some 80 p.ct. back to the public in the way of heat, than to those who destroyed it almost entirely, as the ordinary consumer did, or even to those who only returned a trifling portion to the public in heat, as the electric suppliers did. Therefore, from the national point of view, the necessity of giving the gas industry its requisite supply of coal would be apparent. In conclusion, he moved the adoption of the report and accounts.

Mr. G. W. CAREY seconded the resolution.

Mr. JOSEPH CASH congratulated the Board on the excellent accounts presented. With regard to the Chairman's remarks as to advertising, this was a matter which was entirely in the hands of the British Commercial Gas Association, who put the advertisements in those papers which naturally appealed, as far as they knew, to the public.

The CHAIRMAN said what he grumbled at was bringing such a strong case as theirs with regard to a national commodity down to the level of such things as could only be sold by saying about them what was more or less untrue.

The motion for the adoption of the report and accounts was then passed unanimously.

THE DIVIDENDS.

The CHAIRMAN next moved: "That the sum of £1645 16s., less income-tax, for the payment of the half-year's interest on £65,832 of 5 p.ct. preference stock to the 30th of June, 1919, be set apart, and that the same be paid accordingly, and that a dividend at the rate of 11¼ p.ct. per annum on the 10 p.ct. "A" stock, and at the rate of 8¼ p.ct. per annum on the 7 p.ct. consolidated stock for the half year ended the 30th of June, 1919, subject to income-tax, be and is hereby declared payable."

Mr. J. M. MILES seconded the motion, which was at once carried unanimously.

INCREASED FEES FOR THE DIRECTORS.

The CHAIRMAN moved that the remuneration of the Directors be increased by £125 in each half year. In moving the resolution, he said that no doubt it was usual for such a proposition to come from a shareholder, who was supposed to bring it forward without the Board being aware of it. But he thought it conduced more to the self-respect of the Board, and the intelligence of the shareholders, that he should adopt the course he had. It was six years since the proprietors last recognized the services of the Board in this way; and during these six years their anxieties had not been less, nor had their work been less strenuous; and furthermore money had not the same value that it had in 1913. In these circumstances, he would ask the shareholders to augment the fees paid to the Board by an amount not much exceeding

that paid to a skilled workman among the many hundreds employed by the Company.

Mr. E. L. Burton seconded the motion. He said working men had required to have their pay doubled, and he did not see why the brain worker should be in any worse position in this respect.

The resolution passed unanimously.

Votes of Thanks.

The Chairman then moved a vote of thanks to the executive officers of the Company. The prosperity of the Company, he said, mainly depended upon the excellence of the working results; and this excellence was reflected in the low price at which the Company sold their gas. In the ensuing period, they looked more anxiously than ever to the works to support the Company, and to help to meet whatever demands might come forword. Of Mr. Buckley he could not speak too highly. They owed a great deal to his ability, his industry, his experience, and the devoted way in which he gave his services to the Company. Mr. Roberts and the other members of the executive had loyally carried out their duties; and he was confident that in the future they would receive the same loyal service from these gentlemen that they had had in the past.

Mr. Joseph Cash briefly seconded the resolution, which was carried unanimously.

Mr. J. W. Buckley returned thanks on behalf of himself and the other members of the staff.

The meeting concluded with a vote of thanks to the Chairman and Directors.

BOURNEMOUTH GAS AND WATER COMPANY.

The Half-Yearly Meeting of the Company was held last Friday, at the London Offices, No. 90, Cannon Street, E.C., Mr. William Cash, F.C.A., in the chair.

The Secretary (Mr. Herbert A. Plumb, F.C.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

Salient Features of the Accounts.

The Chairman, in moving the adoption of the report and accounts, said so far as the financial results of the half year were concerned, he did not think he need take the proprietors through the accounts in great detail. In their report, the Directors told them that the sale of gas showed a decrease of 2¾ p.ct. There was no doubt whatever that, if the present restrictions on the use of gas were done away with, the Company would soon recover this business, and the quantity of gas sold would return to its normal condition. In fact, during the current half year, there had been a substantial increase in the quantity of gas sent out. During the half year, coal had cost net—that was, after deducting residuals—4d. per 1000 c.ft. more than in the corresponding period. As mentioned in the report, they had more advantage from the fact that in the half year they had not had to incur the special expenditure which arose a year ago, as well as in the second half of 1918, with regard to the renewal of works. This had effected a saving of some £12,500. Against this other heads of expenditure—repair and renewal of meters, mains, and stoves—showed an increase. These together came to £4620, leaving a net saving on maintenance account of £7880. Rates and taxes were up; salaries showed an increase; and general establishment charges had also advanced. On the other hand, there was some set-off from the fact that "war relief" exhibited a decrease of £920. On the half year, expenses were up by £12,000. The water-rental continued to show its usual rate of progress

Position of the Works.

As to the works, he might say that the Poole works were now in very good order. As he had told the proprietors on a previous occasion, they were finding these works rather cramped, and the time was not far distant when it would be necessary to carry out certain extensions. The plant at Bourne Valley had been put into a state to make gas, and these works were now available to meet any demand that might arise. Regarding the water undertaking, they were considering the question of additional storage, with the relative amount of further filtration. But the time had not actually arrived for the raising of the capital, or for spending money for the purpose.

The Bill in Parliament.

The event of the half year had been the Bill in Parliament. The Company met with a certain amount of opposition. The local authorities felt they had reason for opposing the proposals; and there was also a petition by some of the residents in Poole. The Company had no cause to complain of the local authorities taking up this attitude. It was their right and duty to protect their constituents, if they believed the Company were doing anything which ought to be opposed or was contrary to the general welfare of the town. In the House of Commons, the Company came to an agreement with the Bournemouth Corporation, and slightly reduced the amount of capital that was originally asked for, as well as made some minor alterations in the Bill. The Poole Corporation, on the other hand, felt their case was inadequately dealt with in that House; and therefore they retired from the proceedings at a certain stage, and opposed again in the House of Lords. There a very full hearing was given to their case. It was very completely and ably argued by their Counsel, with the result that the Company obtained their Bill pretty much as they originally asked for it. The all-important question of restrictions existing on certain of the Company's lands at Poole was settled in their favour by removal. The Company, in exchange, gave up the right to erect works on the Beach House site. The cable way—one matter of contention—which was to connect the existing works at the Poole Quay site with the works on the Mud Lands, was sanctioned. The Directors believed it would be a great advantage to the Company when the site was ultimately developed. The new site would have, by means of the cable way, access from the sea for coal; and it would also have access by rail, as they had made arrangements with the South-Western Railway Company by which they would give the Company sidings right into the works. Thus they would have transport alternatives conveniently arranged when the site was developed. He might say at once that before actually deciding on extensions there, the Directors, from every point of view, would exercise the greatest care in providing the most complete and up-to-date methods of manufacture that would be available. They would also do their utmost to assure that the works that were erected were not an annoyance to the neighbourhood. They would endeavour to the best of their ability to mitigate any cause of objection. Therefore it was hoped that what had taken place would not disturb permanently the amicable relations between the Company and the local authorities which had existed for so many years. The Directors, however, had no reason to think this would happen. The cost of obtaining the Bill so far as incurred had been charged to the profit and loss account. The amount was £2315. Had it not been for this item of expenditure, the dividend would have been earned in the half year.

Conversion of Original Shares.

The other matter which might interest the proprietors was that, as from Jan. 1 next, the present "original" shares would be converted by giving each holder two shares of £10 each for one share of £10, but carrying half the standard dividend and half the actual dividend which at present applied to the shares as they stood to-day.

Labour Topics; Clerical Staff; Employees who Served.

Turning to the future. With regard to labour, he thought there was a distinct improvement in their relationships with the men; and it was hoped that no fresh demands would be made upon the Company for increased wages. During the half year, they had had to meet a demand for lessened hours of work in common with other gas undertakings. They had endeavoured to treat their men fairly, and on no worse terms than other gas undertakings. In this half year they had to deal with their clerical staff who had served them loyally and efficiently during the war; and this would involve some small addition to their expenses. It might interest the proprietors to know that of the Company's employees, 300 went to the war, 234 had returned, and 40 had still to return. There were killed abroad 13 married men and 13 single men. Two men had been disabled. He ventured to think this was a splendid record so far as the number of men was concerned who had served out of the total employed. The Directors and officers were keenly proud of them; and they were glad to know that so many of the men had returned to the Company's service. On other occasions, they had expressed, and they repeated again that day, their sympathy with the relatives of the men who had lost their lives.

Coal and Transport Topics.

The next matter of importance was that during the current half year there had been an increase in the price of coal of 6s. per ton, which was universal—not only applying to all gas companies but to the whole coal trade. In addition to this the companies on the South Coast, and some of the towns south of London had been informed that they would have to bring coal by water instead of by rail. This would mean a very substantial and further increase in the cost to this Company, and to the other companies who were situated in the same geographical area. They were told, and with a certain amount of truth, that, in comparing the additional cost of freight with the railway rate, it must be borne in mind that the latter was a subsidized rate—that was to say, the railways were carrying at prices that were not remunerative, and so involved a loss to the Government under the arrangements in force. The whole gas industry would say they had no desire to have subsidies either on railway or shipping rates; but they did ask that the consumer and the trader should at least be granted a free market, so that he might make his own transport arrangements by whatever course might be the best for him, and that he might buy such coals as were best for his particular processes. The position to do this had not, of course, been arrived at at present. Under existing circumstances the conduct of business was therefore very difficult. They had to take coal the way they were told to, and they had to purchase it from the district from which they were told they might have it.

Control—Not Nationalization.

Personally, he was glad to see the Government had decided against nationalization of the coal mines. It was perhaps of some interest to those in the room to remember that the scheme the Prime Minister had outlined was very much the scheme of the Duckham report; and they were proud to remember that Sir Arthur Duckham was not so very long ago engaged at Bournemouth as one of their officers. Furthermore, a principle had been adopted that was in a measure something like the principle applied in the gas industry, in the sense that there would be protection, as was hoped, of the consumer in the price of coal.

Increase in the Price of Gas—Revision of the Terms of the Sliding-Scale.

To meet the increase in charges which the additional price of coal and carriage would involve, it would be necessary to increase the price of gas from Michaelmas. They would be in the same position in this respect as most other gas undertakings. The price of gas was put up 4d. on July 1, and now another 4d. would be added from Oct. 1—making the increase 8d. in all. The effect of this would be to reduce the dividend on the ordinary shares in the current half year to 10 p.ct. or the standard dividend. This was undoubtedly a serious matter so far as this particular capital was concerned; but it only affected relatively a small proportion of the capital. But to this extent, and in common with other gas undertakings, they did say and felt very strongly, that the time had come for dealing with and revising the sliding-scale provisions as they existed to-day. The matter was in the hands largely of the National Gas Council. As the proprietors knew, there was an Act at present in force—the Statutory Undertakings (Temporary Increase of Charges) Act—which was only a temporary measure, and consequently it only provided an entirely inadequate measure of relief. So far as this Company was concerned, it afforded no relief whatever, because the Board of Trade under the provisions of the Act were only entitled to grant the companies seeking relief permission to pay three-quarters of the standard dividend or the pre-war average dividend, whichever was the lower. In the case of this Com-

pany, they would be able to pay 7½ p.ct. So long as they could continue to pay a dividend of 10 p.ct., the Act was of no advantage to them specially. The whole industry, however, was crying out for relief; and the fact was admitted by all parties that the industry was being penalized by circumstances over which it had no control. As to what scheme or method should be adopted for putting right the present injustice, it was extremely difficult to say. The main difficulty was to find a formula which would apply fairly and evenly to all companies. At the same time, they believed the Board of Trade would be prepared to take steps to grant some amendment of the existing position, and simultaneously would probably deal with the question of the quality of gas to be supplied. There was reason to hope that greater freedom of action would be allowed to gas undertakings, bearing in mind the fact that what they had to sell was really a commercial article. They had a monopoly of the gas supply, but they had not a monopoly of the supply of fuel or light.

RELATION OF GAS AND ELECTRICITY TO COAL CONSERVATION.

Regarding the competition of electricity, he might remind the proprietors that there was a Bill at present before Parliament which seemed to provide a subsidy for the electricity supply industry. There had been a great deal of talk about super-stations and the increased efficiency of electricity; and, of course, they were not there to dispute the fact that electrical energy was useful and convenient. What they did suggest was that, in a measure, it was a luxury, because the consumption of coal for the generation of electric energy was much more expensive and uneconomical, whether used for lighting or fuel, than if used for general lighting and heating purposes by the carbonization of coal as was done in gas-works. The use of crude coal, especially in the ordinary household fire, was an extravagance which, in view of the present national position, was almost criminal. Out of every ton of crude coal which was burned in the ordinary open grate, effective heat only equal to 5 cwt. of coal was thrown out into the room to do useful work. The other 15 cwt. went up the chimney, together with the valuable bye-products—the ammonia, tar, benzol, &c.—and was a dead-loss on the national balance-sheet, besides being a source of contamination to the air. Crude coal used in boiler fires and for other industrial purposes was not so wasteful in actual heat as crude coal used in an open grate. But even there all the valuable bye-products were lost to the country. Electricity had been looked upon by many as the last word in scientific super-efficiency. Few, however, had realized until recently how grossly inefficient it was when stated in terms of the coal used to generate it. Put in a simple form, the facts were these: For every ton of coal used in the generation of electricity, heat or its equivalent in mechanical power equal to only 2 cwt. of coal was available for the consumer in the form of electrical energy. These were the figures for the average type of electricity works. Even based upon the best promises of the much-talked-of super-generating stations, a ton of coal would only give the consumer the equivalent of 4 cwt. of coal in the form of electrical energy. In the generation of electricity, all the bye-products of coal were also absolutely lost to the nation. From the national standpoint, the gas-works of the country were by far the most efficient and scientific utilizers of coal. Out of every ton of coal handled by a modern gas-works, 14 cwt. found its way in some form or other to the various consumers. In a gas-works, there was made from 1 ton of coal: Gas equal to a heating value of 5 cwt. of the original coal; coke equal to a heating value of 8 cwt. of the original coal; and tar equal to a heating value of 1 cwt. of the original coal—a total of 14 cwt. In addition, benzol, toluol, naphthalene, cyanides, and sulphur were produced for the many scientific processes for which they formed the raw materials. Of course, it was not suggested that the supply of electricity should be abandoned where its convenience and special means of application made up for the cost of production, or where, as in certain cases, it was undoubtedly the most efficient power available. It was, however, most strongly urged that everyone should be fully acquainted with the facts in regard to the economical use of the nation's resources, and that this vital question should be studied with a knowledge of the problems involved, the economies that could be effected, and the best means of carrying these economies into effect. These matters had been the subject of most careful and elaborate investigations by fully-qualified investigators; and he did think it was important that gas shareholders should take every opportunity of circulating the facts, and putting forward the importance of the industry, and the advantages in the conservation of coal that accrued from the methods which gas supply involved. The industry was one which ought to be supported, and ought not to be crippled; and it was of the utmost importance that it should be made attractive for capital. Many gas companies required additional capital for extensions, and developments were approaching. Unless the industry was put into a position to obtain capital for these purposes, it would not be possible to carry out these developments with advantage not only to the industry, but to the nation as a whole.

Lieut.-Col. CHARLES L. MORGAN, C.B.E., seconded the motion, which was unanimously carried.

THE DIVIDENDS.

Proposed by Mr. E. HONORATUS LLOYD, K.C., and seconded by Sir CHARLES J. JESSEL, Bart., the statutory dividends were declared at the following rates per annum, less income-tax: 6 p.ct. on the preference shares, 7 p.ct. on the "B" ordinary shares, and 12 p.ct. on the original shares.

VOTES OF THANKS.

Moved by Mr. CHARLES WEBB, and seconded by Mr. R. H. GLEN, F.C.A., a cordial vote of thanks was passed to the Chairman and Directors, to the chief officers, their staffs, and the workmen. Mr. Webb remarked upon the strenuous and anxious times through which all connected with the management of the Company had been passing, and which times were still with them.

The CHAIRMAN acknowledged the vote on behalf of the Directors, and added that the part of the resolution which referred to their officers and staff had the entire concurrence of the Board. They had had the advantage this half year—not quite the whole of it—of having Colonel Woodall back. They were very glad to have him with them again. He had gone straight into the saddle, and was hard at work. He helped them to get the Bill through Parliament, though only just then returned to this country. Mr. Moon was with them at Bournemouth, and doing excellent work. The staff served them admirably; and they were receiving loyal service from their men.

Lieut.-Col. WOODALL, on behalf of the staff and men, thanked the proprietors heartily for their vote of thanks, and the Chairman for the kind words he had used. He was glad to hear what he had said; and with regard to labour, he (the speaker) thought things did look better. The future certainly seemed more promising than they had reason to hope for a few months ago. He was glad to assure the proprietors of the loyal and hearty support not only of the staff, but of the workmen.

SALFORD CORPORATION GAS DEPARTMENT.

Annual Report and Accounts.

A copy is to hand (from Mr. W. W. Woodward, the Gas Engineer and Manager) of the annual report and statement of accounts of the Gas Department of the County Borough of Salford, for the year ended March 31 last.

The report—signed by Alderman F. S. Phillips, the Chairman of the Committee—records that, notwithstanding war conditions, the number of consumers slightly increased during the year. The sales of gas, however, showed a decrease equal to 0·83 p.ct., due to the operations of the "Household Fuel and Lighting Order, 1918."

The coal and cannel carbonized amounted to 132,581 tons, as compared with 136,823 tons for the previous year. The quantity of gas made was 1,554,813,000 c.ft., as compared with 1,591,460,000 c.ft. for the previous year.

The works and plant have been maintained in a thorough state of repair. The installation of vertical retorts is practically completed; the retorts are under fire; and the plant will be in full work in the course of a few weeks.

The total number of cookers, ordinary and prepayment, on hire at March 31, was 18,237; and the total number of gas-fires on hire at the same date was 3221. These figures are practically the same as the previous year; but at the present time there is a great demand for both cookers and fires, and large numbers are being fixed.

The receipts from the sales of coke, tar, and sulphate of ammonia show increases as compared with last year; but benzol shows a decrease.

The expenditure during the year was again very heavy, owing to advances in wages, increased war bonuses, additional payments to dependants of men on active service, further large advances in the cost of coal, and to higher prices for all other materials required.

Since the close of the financial year, there has been a further increase of 6s. per ton in the price of coal—placing an increased burden on the undertaking of about £40,000 per annum.

Wages and war bonuses are continually rising; and the cost under these headings for the ensuing year will greatly exceed the cost for the past year. It is also most probable that there will be further increases in the cost of all materials required during the current year.

Against this enormous increase in expenditure, it is expected there will be some improvement in the total receipts from residuals; but this can only be small compared with the increased expenditure.

It was hoped that the "Household Fuel and Lighting Order, 1918," would have been withdrawn at the end of the war; but, unfortunately, owing to serious falling off in the output from the coal mines, it has been considered necessary to make a further Order, which came into operation on the 1st of July. The use of gas is, therefore, still restricted: and this will, of course, adversely affect the revenue of the undertaking.

In view of the circumstances referred to above, the Committee will have to consider immediately the best means of increasing the revenue of the undertaking.

STATE REGULATION OF HOURS OF LABOUR AND WAGES.

Text of Two New Bills.

The text of the Bill to regulate the number of hours of employment, introduced in the House of Commons by Sir Robert Horne, was issued last Tuesday. The Bill provides that the number of working hours (exclusive of recognized intervals for meals) in any week shall not in the case of any person to whom the measure applies exceed forty-eight, and no person may in any week be employed in excess of the statutory working week. Power to vary normal hours, or grant exceptions, is given to the Home Secretary or Minister of Labour where a recommendation to that effect has been made to him by a Joint Industrial Council, Conciliation Board, or Trade Board, or an agreement has been arrived at between organizations of employers and workers in the class of employment in question.

Any hours worked by any person in excess of the statutory working week shall be regarded as overtime; and the decision as to the amount of overtime and the conditions under which it may be worked rests with the Home Secretary or the Minister of Labour. The payment for overtime shall in no case be at a rate of less than 25 p.ct. in excess of the normal time rate; but any more favourable custom prevailing in any class of employment shall not be affected. The penalty for contravening the provisions of the Act is a fine not exceeding £10 for each offence. The measure does not apply:

(*a*) To members of the employer's own family dwelling and working in his house.

(*b*) To domestic and outdoor servants, except where employed in connection with any trade for purposes of gain.

(*c*) To persons holding responsible positions of supervision or management, who are not usually employed in manual labour, or to persons who are in receipt of upstanding wages which have been fixed upon a basis of hours equal to, or less than, the

statutory working week, and which cover overtime necessarily worked to enable such persons to perform their duties to their employers and to the workers under their charge.

(*d*) To persons employed in a confidential capacity who are not usually employed on manual labour.

(*e*) To any master seaman or apprentice of a sea-going ship.

(*f*) To persons whose hours of employment are regulated by the Coal Mines Acts, 1887 to 1914.

(*g*) To any person employed in agriculture—including horticulture, agriculture, and forestry.

(*h*) So as to prevent a person who ceases his employment with one employer and commences his employment with another employer, in the course of the same week, from being employed by the subsequent employer in accordance with the hours customarily worked by persons in his own employment.

The Act applies to persons employed in the service of the Crown or of any local or other public authority, except persons in naval, military, or air services, or members of any police force. In exercising his powers under the measure, the Minister shall have regard to any general recommendations made by the National Industrial Council. His Majesty in Council may, in the event of war or of imminent national danger, by Order suspend the operation of the provisions of the measure. The Act is to come into operation six months after the Bill has been passed; but the Minister may, if he thinks fit, by Order suspend its coming into operation for any specified class of employment for a further period not exceeding six months.

The Minimum Rates of Wages Commission Bill, which was also introduced on Monday last week, authorizes the appointment of Commissioners, consisting of a Chairman and such other persons as His Majesty may think fit, for the purpose of:

(*a*) Inquiring into and deciding what such minimum time rates of wages should be, regard being had to the cost of living in the various districts, and any other matters which appear to the Commissioners relevant.

(*b*) Inquiring into and making recommendations as to the methods and successive steps by which such minimum time rates of wages should be brought into operation, and the machinery by which they may be varied as and when occasion requires.

(*c*) Inquiring into and making recommendations as to the granting of exemptions from the rates so fixed in the case of infirm and incapable workers and in other exceptional cases, and the methods by which such exemptions should be granted.

(*d*) Making recommendations as to the legislation necessary for such purposes as aforesaid (whether by amendment of the Trade Boards Act, 1909 and 1918, and other enactments relating to minimum rates of wages or otherwise), and what amendments of the law, if any, are desirable.

The Commissioners may by Order require the production of documents and the attendance of witnesses; any person failing to comply with such Order or giving false or misleading evidence being liable to a fine of £50, or imprisonment for a term not exceeding one month. The Commissioners are to have power to appoint Committees for the purpose of inquiring into, and reporting on, any of the matters referred to the Commissioners under the Act. Such Committees may include, if the Commissioners think fit, persons other than Commissioners; and the Commissioners may delegate to such Committees any of the powers conferred on them by the Act. The Commissioners may appoint an Accountant to examine registers, wages-sheets, balance-sheets, profit and loss accounts, and other trade accounts of persons engaged in the trade or industry of a district in which an inquiry is being held.

GAS-WORKERS' WAGES DISPUTES AT HASTINGS AND KIRKCALDY.

A Court of Arbitration has made the following wages award in the case of the Hastings and St. Leonards Gas Company and the National Union of General Workers.

The claim submitted was: (1) For an advance of 3s. 6d. a week to all employees of the Company, with effect from the 5th of July, 1919. (2) For the substitution of a 47-hour week for day workers employed by the Company, with effect from the 11th of July, 1919.

The matter was referred for settlement, under the Conciliation Act, 1896, by the Ministry of Labour to the local Court of Arbitration, and representatives of the parties were heard on the 6th inst. The men concerned are employed by the Company at the Glyne works, and also at the Hastings works; and the total weekly war advances which have been granted amount to 24s. at Glyne and 22s. at Hastings, with a bonus of 12½ p.ct. on earnings in the case of both works. The extra 2s. granted to men engaged at the former works was intended to meet the cost of travelling to and from Hastings. The normal working week has recently been reduced from 56½ hours to 48 hours a week without any reduction in weekly wages.

The award of the Court is as follows: The men concerned, aged eighteen years and over, shall receive an advance of 3s. 6d. a week from the 5th ult., for which they shall receive such total sum as was payable for 48 hours. The amount awarded is to be taken into account in the calculation of payment for overtime and night duty, and for work on Sundays and holidays (where extra payments are made for such work). It is to be regarded as a war advance, and recognized as due to and dependent on the existence of the abnormal conditions now prevailing in consequence of the war.

Gas-Workers: Borough of Kirkcaldy.

The parties to this reference were the Borough Council of Kirkcaldy, and the National Union of General Workers. The claim submitted was that the award [No. 269] of the Court of Arbitration of Feb. 25 last should be made applicable to the wages, as existing on Feb. 1, of the members of the Union employed as gas-workers of the Kirkcaldy Borough Gas Department. The matter was referred, under the Conciliation Act, 1896, by the Ministry of Labour to the Court of Arbitration for settlement, and representatives of the parties were heard at Glasgow on the 8th inst.

The award No. 269 (above referred to) was granted in respect of a difference between the National Gas Council and the National Federation of General Workers. Under the award a weekly advance of 5s. was granted to men and women, aged eighteen years and over, payable at the rate of 10d. a day or shift; and a weekly advance of 2s. 6d. was granted to boys, youths, and girls, under eighteen, payable at the rate of 5d. per day or shift—both advances to take effect from the beginning of the first full pay following Feb. 1. Clause 4 of the award No. 269 is in the following terms:

> "The men concerned have received war advances amounting to a maximum of 23s. 6d. a week (*plus* a bonus of 12½ p.c. and 7½ p.ct. on earnings for timeworkers and pieceworkers respectively, twenty-one years of age and over)."

The various grades of men concerned in the present claim received advances varying from 6s. 3d. to 6s. 10d. a week from the pay period ended Jan. 4. Prior to this date they had received war advances varying from 21s. 5d. to 22s. a week and also bonuses of 12½ p.ct. and 7½ p.ct. on earnings for timeworkers and pieceworkers respectively.

The contention of the Council was that they gave in January last advances in excess of those granted under the award No. 269, and that accordingly the advances granted under the award No. 269 fall to be merged in those granted in January.

The contention of the workpeople was that the advances granted by the Council in January ought not to be considered as affecting the position of the Corporation with regard to the award No. 269, as these advances were granted voluntarily without any application on behalf of the workpeople, and with the object of preventing them from going elsewhere where they could receive higher wages.

The award of the Court was that, on the facts above stated, the Council were justified in not giving effect to the provisions of the award No. 269.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 25.

Pitch continues in strong demand, and there is a good deal of business offering. At present, makers are rather inclined to wait in the expectation of higher prices. Creosote is steady at about 6d. per gallon, net in bulk. Solvent naphtha is from 2s. 3d. to 2s. 4½d. per gallon net and naked. Pure toluol and pure benzol are about 2s. 9d. per gallon net.

In sulphate of ammonia, the position remains unchanged.

Tar Products in the Provinces.

Aug. 25.

The average values for gas-works products during the week were: Gas-works coal tar, 36s. 3d. to 41s. 3d. Pitch, East Coast, 63s. 6d. to 64s. 6d. per ton f.a.s.; West Coast—Manchester, 54s. to 56s. 6d.; Liverpool, 54s. to 56s. 6d., Clyde, 65s. to 70s. nominal. Benzol 90 p.ct., North, 1s. 8d. to 1s. 10d.; crude 65 p.c., at 120° C. 11½d. to 1s. 0½d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 8d. to 1s. 10d. Toluol, naked, North, 2s. to 2s. 1d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 11d. Heavy naphtha, North, 2s. 1d. to 2s. 3d. Creosote, in bulk, North, liquid, 5d. to 5¼d.; salty, 4¾d. to 4¾d. Heavy oils, in bulk, North, 6d. to 6¼d. Carbolic acid, 60 p.ct. 1s. 5½d. to 1s. 6d. Naphthalene, £15 to £17 10s.; salts, £4 10s. to £6, bags included. Anthracene, "A" quality, 7¼d. to 7½d. per minimum 40 p.ct.

Manchester District Tar Prices.

The average price realized for tar in the Manchester district, based on the value of the products, for the month of July was £2 10s. per ton.

FROM A MARKET CORRESPONDENT.

Tar Products.

Market conditions remain somewhat disturbed by the general trade outlook in the country. Trade can hardly be good until the whole vexatious system of licences is done away with. Unfortunately, there is no sign of this yet—indeed, the prospects are for a further increase in the powers of the Board of Trade, which powers, in the past, have never been used for, but always against, the development of business. The recent coal strike has led to a scarcity of supplies in tar products; and although there is now reported to be less absenteeism and a greater output at the coal mines than for a considerable time past, it will be some weeks before tar distillers can recover from the effects of the stoppage. The result is that prices keep up. Pitch is very firm, and up to 75s. per ton London has been reported. Provincial makers have advanced prices on some fair inquiries for home and export. There is no special anxiety to sell; the desire being rather to wait and see what the late autumn may bring. Crude tars are rather harder. Naphthalenes are dull, although there is rather better inquiry for crudes. Cresylic acid remains without change; but carbolics are in request. Crude particularly is wanted; but there is nothing on offer—consumers being willing to pay about 1s. 8d. per gallon, while makers are unwilling to take out the acid at less than 2s. per gallon. Crystals are again dearer. Creosote is firm; but the market depends to some extent upon new tonnage. Naphthas are steady; but there is not much doing again in solvent. Benzols are in request for motor purposes at full prices; the make, particularly in the Northern districts, being fully absorbed. Other products are without change.

The range of quotations is as follows:

Benzol: 90% London 2s. to 2s. 2d., North, 1s. 11d. to 2s.; 50-90% 1s. 9d. to 2s. London, 1s. 9½d. North; crude 60-65% 1s. 3½d. to 1s. 5½d.; pure, 3s. per gallon naked.

Carbolic acid: Crude 60's 1s. 8d. per gallon nominal; crystals, 40%, 9½d. per lb. asked.

Crude Tar: London, 47s. to 50s.; Midlands, 44s. to 46s.; North, 44s. 6d. per ton *ex* works.

Pitch: London, 70s. to 72s. 6d. per ton; East Coast, 58s. to 62s. per ton; West Coast, 57s. to 60s., with Manchester 59s. 6d. per ton and Glasgow 60s. per ton; South Wales, 64s. to 68s. per ton.

Solvent Naphtha: London, 2s. 3d. Provinces average 2s. per gallon.

Crude Naphtha: Naked, 10d. per gallon.

Heavy Naphtha: 2s. 3d. per gallon.

Naphthalene: Refined, £15 to £17 per ton nominal; crude, £4 to £8, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d.

Creosote: London, 7¼d.; North, 5⅜d. to 6¼d.; heavy oil, 6d. per gallon in bulk.

Anthracene: 40-45%, 7d. to 7½d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 2d. per lb.

Cresylic Acid: 95%, 2s. 4d. to 2s. 6d.; 97-99%, 2s. 7d. to 2s. 9d. *ex* works London, f.o.b. other ports.

Sulphate of Ammonia.

Production has been greatly retarded by the strike in the Yorkshire coal mines; and as far as one can see, the result will be that the whole output will now have to be reserved for home purposes, and there will be nothing left for export. This is much to be regretted, as in these days, when the foreign exchanges are so heavily against us, anything that tends to lower exports is bad. Latest information from the United States indicates that supplies there are plentiful. Exports are still being made at less than the equivalent of £20 per ton f.o.b. New York.

Gas Famine in Goole.—Last Saturday week the town's gas supply almost gave out; and during the week-end the Gas Manager had a hard struggle to keep the works going. There was great anxiety in the town—especially on the part of those who use gas for business purposes. Local picture houses were unable to give the usual afternoon performance. The local newspaper office, too, was in difficulties, as the heat on the typesetting machines was inadequate; and hand-setting had to be resorted to until the gas supply improved. The light in the houses was too poor for reading or sewing, and candles and lamps had to be used. The ordinary stocks of coal at the gas-works were entirely exhausted; and for the past few days Durham coal (of unsuitable variety, producing comparatively little gas) has been used.

Wellingborough Gas Company.—In their report to the shareholders at yesterday's meeting the Directors of the Company stated that the profit for the half year to June, after providing for the year's income tax and interest and other charges for the half year, was only £402; but with the balance brought forward from the previous half year, a sum of £5816 was available for dividends, of 6⅜ p.ct. on the "original" and 4⅜ p.ct. on the "additional" shares, less income tax. These will absorb £2009, leaving £3807 to be carried forward. The Directors regret to announce that the price of gas will be increased by 7d. per 1000 c.ft. from the September meter-reading.

Harrow and Stanmore Gas Company.—The half-yearly meeting of this Company will be held next Monday, to receive the accounts for the half year ended June 30. The sale of gas shows an increase of 5·98 p.ct. over the corresponding previous half. The price of gas (increased to 3s. 8d. at Midsummer, 1918) was 4d. more than in the corresponding previous half year; and the recent increase of 6s. per ton of coal with the great advance which has taken place in wages will necessitate an addition to the price of gas from Michaelmas next. The balance of the profit and loss account is £12,274; and the Directors recommend dividends at the rate of 5½ p.ct. per annum on the ordinary stock, and of 5 p.ct. per annum on the preference stock both less income-tax—leaving £5502 to be carried forward.

Portsmouth and its Gas Supply.—The Gas Examiner to the Portsmouth Corporation has reported that tests have been made as usual for the calorific value of the gas, which had kept fairly regular at an average of 460 B.Th.U. He is afraid that this will hardly be maintained during the coming winter, in consequence of the coal difficulty. He understands that the Coal Control Board have practically closed all Midland supplies to the South of England; and if this is so, not only will the coal which will be sent to Portsmouth be of inferior quality for gas making, but the cost will be greater; and this will probably mean another increase in price. Except on one occasion when, owing to an accident, there was an excess of sulphur compounds, there has been no cause to complain of the purity of the gas, and the pressure and general supply have been "fairly maintained."

Southgate and District Gas Company.—At Thursday's meeting of the Company, the accounts to be presented for the six months to June 30 show that compared with the half year to June, 1918, the sale of gas increased by 3,813,300 c.ft., or 3·13 p.ct.; and the revenue from residual products increased by £1042. The expenditure on revenue account, however, exceeded that for the corresponding period by £5927. The cost of production has continued, and still continues, to increase, the Board report—chiefly owing to further advances in the charges for coal and wages. After providing for interest and income tax, there remains a balance of profit of £5021. The Directors recommend payments for last half year at the rates of 5, 10, and 7 p.ct. per annum on the various classes of shares. This appropriation will require the sum of £4325 and leave a balance of £696 to be carried to the credit of the profit and loss account for the current half year.

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Swadlincote Gas Undertaking.—The Swadlincote Urban District Council gas accounts for the year ended March 31 last show a "profit" (after meeting £2554 for repayment of loans and interest) of £254, which, "considering the exceptional times through which the concern has passed, is regarded as very satisfactory." It has been resolved to make application for power to increase the price of gas by 1s. per 1000 c.ft. over and above the price fixed by their Act.

Increased Sales of Gas at Chichester.—At to-day's meeting of the Chichester Gas Company the accounts to be submitted show a further increase in the sale of gas equal to about 5½ p.ct., as well as an improved return from residual products. Coal, however, causes the Board "considerable anxiety as to price and delivery during the coming half year." The balance of the profit and loss account is £2044, out of which a dividend at the rate of 5¾ p.ct. per annum on the "A" stock, and of £4 0s. 6d. p.ct. per annum on the "B" and "C" stocks (all less income tax), will be paid, and absorb £901 9s. 8d. The Engineer (Mr. T. N. Ritson, Assoc.M.Inst.C.E.) reports that the works and mains are in a "satisfactory condition."

Barnsley Gas Company.—In their annual report the Directors of the Barnsley Gas Company state that the sales of gas to consumers for the year ended June 30 amounted to £33,887; rental of meters came to £851; and public lighting and other contracts brought in £152—a total of £34,890. From this, £872 was deducted as discount. The sales of residual products realized £13,875. The total income was £51,131, the expenditure £44,304—leaving a credit balance of £6827. Coal for the year cost £21,901. The interim dividend was confirmed; and the Directors recommended that a further dividend be paid of 5 p.ct. on the general capital stock and "F" shares; 3 p.ct. on the "C" (preference) shares; and 3½ p.ct. on the "D," "E," and "G" shares, less income tax in all cases.

Watford Gas Company.—There is again at Watford an increase in the sales of gas, though this is not apparent from the statement of gas made; the reason being that in the accounts for the first half of 1918, an extra three months' make of gas at the Rickmansworth Gas-Works was included. Residuals also show a satisfactory increase. On the other hand, the Directors were obliged last April to advance wages by a further 6 p.ct., and following this advance reduce the working hours, and thereby still further increase the cost of labour. These increases, added to the continually rising prices of all plant and materials, made an increase in the price of gas of 4d. per 1000 c.ft. imperative, as from July 1. Since then the 6s. per ton added to coal prices, and the order of the Coal Controller, that deliveries must now be made by sea, means a further addition to the cost of no less than 11s. 6d. per ton—making a total of 17s. 6d. per ton. Another increase in the price of gas at an early date, the report points out, cannot therefore be avoided. The revenue account shows a profit of £4783; and after providing for interest on mortgages and loans, there is a balance of £3302. The Directors recommend statutory dividends at the rate of £5 12s. 6d. and £4 2s. 6d. p.ct. per annum (less tax) on the two classes of the Company's capital.

No Public Lamps for Midhurst.—Last week the Midhurst Parish Council had before them a letter from the Secretary of the Midhurst Gas Company stating that, owing to the very unsettled state of affairs in regard to coal and labour, the Company were not in a position at the present time to enter into a contract for lighting the town lamps. The lighting account for the year showed that the cost of lighting 33 lamps (half the total number) from December, 1918, to the end of April last was £95.

Rossendale Union Gas Company.—The Directors in their report for the half year ended June 30 state that the sales of gas for the period showed a decrease of 4·65 p.ct. compared with the corresponding period last year. The profit for the half year was £4568. The total expenditure was £27,989, and the income £32,557. There had been 10,894 tons of coal carbonized in the six months; while 5241 tons of coke and 595 tons of tar had been sold. Dividends at the rate of 10, 7½, 7, and 5 p.ct. are to be paid on the various classes of shares. The capital expenditure is £181,777; and £20,262 was paid last half year for gas manufacture and £1595 for distribution. The sales of gas realized £22,714; the meter and stove rents, £658; and residual products, £9061.

Cashel Gas-Works to be Leased.—At the last meeting of Cashel (co. Tipperary) Urban District Council, it was decided to accept an offer for the leasing of the gas-works received from Mr. Matthew M. Hanly, of Cashel, who intimated that he was prepared to undertake not to charge more than 10s. per 1000 c.ft. during the first year under the lease, irrespective of the price of coal. The Council also conceded an option to renew the arrangement for a period of twenty years. Mr. Hanly remarked that the Council were said to be losing £400 or £500 a year on the works. He estimated that the public lighting would bring in only £100 a year; but his hope lay in gas-cookers and slot-meters to encourage the use of gas in working-men's homes. He calculated that it would take £1000 to put the works in good order.

A Slot-Meter Wager at Brentwood.—In an editorial which appeared in the "JOURNAL" dated June 24 reference was made to the fact that the Brentwood Gas Company, having been charged with making huge profits at the expense of the consumers, the Directors had invited the formation of a Standing Committee, to see that fair treatment was being meted-out. Now the "Evening News" reports that, at a meeting of the Urban District Council, the Chairman (Mr. J. J. Crowe, J.P.), who is also Chairman of the Gas Company, said he would make a sporting offer, that if anyone could prove that the Gas Company had charged any person 9s. a year for slot-meter rent, instead of the authorized 6s., he would give that person £50. Subsequently, Councillor A. G. Collis, who has been criticizing the Gas Company very strongly, put in a claim for the £50, and offered his proofs. These were rejected by Mr. Crowe; and the matter was referred to Mr. Sidney Vincent, the Chairman of the Lighting Committee, with whom Mr. Crowe deposited the £50. Mr. Vincent duly scrutinized the "proofs" for the purpose of giving a decision as Referee, and subsequently decided that the documents "do not prove the allegations."

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Edinburgh Gas Accounts.—The Edinburgh and Leith Gas Commissioners' accounts for the year to May 31 show a gross revenue of £540,434. The expenditure totalled £435,577. The gas manufactured aggregated 2,191,327,000 c.ft. The quantity sold in bulk for motor-car power was 1,203,800 c.ft. Residual products (including toluol and benzol) yielded a net revenue of 12s. 1·57d. per ton of coal carbonized and oil equivalent.

The Wandsworth, Wimbledon, and Epsom District Gas Company have intimated to their consumers that the rentals of meters, stoves, and other apparatus let out on hire will be increased by 50 p.ct. from Michaelmas.

The State of Bahia Development Company, Ltd., is the title of a private Company registered on the 9th inst. with a capital of £50,000 in £1 shares. The objects of the Company are "to construct, improve, manage or control public works and conveniences of all kinds, including gas-works."

The Board of Radiation Ltd. have declared interim dividends as follows: On the preference shares at the rate of 6 p.ct. per annum, less income tax, and on the ordinary shares at the rate of 5 p.ct. per annum, free of income tax. The dividend warrants will be sent out about the 15th of September.

Mr. J. Woods, who has been Secretary and Manager of the Monaghan Lighting Company, Ltd., since April, was previously at Clones; and during the eighteen months he spent there, the output of gas was increased by 1½ million c.ft. Some time after leaving their service, he had the satisfaction of receiving a substantial cash bonus from the Directors of the Company.

Mr. W. Millar, of Cookstown, who occupies the position of Town Surveyor as well as Gas Manager, has had a grant of £3097 from the Road Board, and to this the Urban District Council are adding £1091—making a total of £4188, which is to be spent on laying a broad strip of tar macadam through the main street of Cookstown. He is bringing the stones in, and putting down a gas-engine to run a breaker.

STOCK MARKET REPORT.

THE Stock Exchange opened on Monday full of hope and in the expectation of great things from Mr. Lloyd George in the epoch-making manifesto he was to pronounce in the House of Commons that afternoon. Markets generally held firm, and no one thought of marking any line down. The disappointing sequel is a matter of history; and the initial failure was not remedied by the subsequent amending postscript. Dulness resumed its sway in most markets, and prices drooped, though they were not quite at their worst at the close. Business was very quiet, and the removal of some "D.O.R.A." restrictions on dealing with securities from abroad came too late to make much difference. Moreover, some restrictions, removed from outsiders, were still left attached to members of the House.

The gilt-edged market (after Monday) was weak. War Loans and Consols fell freely; the 5 p.ct. Loan touching 94 and Consols 51¼. Bonds were not so bad. Home Rails picked up a little upon the settlement of one wages' dispute; but Canadians and Argentines were both in lack of much support.

The Foreign Market generally was dull. French loans had a sharp fall; but on Friday they had an equally sharp rebound, and closed not much the worse. The military successes against the Bolsheviks helped Russians to some extent; and Japanese were firm.

In Miscellaneous, Rubber was better, and Oils, after fluctuations, closed well. An incident of the week interesting to gas shareholders was an agreement for the Anglo Persian Oil Company to purchase the Scottish oil companies. The British Government holds a controlling interest in the Persian Company.

Business in the Gas Market was almost torpid; only eight of the listed companies being dealt in at all. Nevertheless the tendency showed a distinct improvement, and in several lines moderate advances were recorded. In the Metropolitan Companies, Gas Light ordinary and South Metropolitan advanced their quotations by 2 each; and in the Continentals, Imperial had a rise of 2 in the ordinary and of 1 in the debenture.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 51½, 51⅝, 52, ditto preference 65, Imperial Continental 126, 126½, 127, 127¾, 128, 128½, ditto debenture 80. On Tuesday, Gas Light preference 65, ditto debenture 53, ditto 10 p.ct. bonds 159½, 159½, Imperial Continental 129, Oriental 104½, 105, South Metropolitan 51½, 52½, ditto debenture 53, Ryde 48½. On Wednesday, Gas Light ordinary 52, 52½, 53, Imperial Continental 129, Oriental 105½, South Metropolitan 52⅜, South Suburban 74. On Thursday, Cape Town 6¼, Gas Light ordinary 52⅝, 53⅛, Imperial Continental 128½, 129, 129½, 130, 130½, ditto debenture 79⅜, Cape Town debenture 70, Ryde 48⅜. On Friday, Cape Town 6⅜, European 12½, Gas Light ordinary 53, 53⅛, 53⅜, ditto preference 66½, ditto debenture 52. Imperial Continental 129, 130, Primitiva preference 66s. 3d., ditto debenture 71½, South Metropolitan 53½.

In the Money Market, rates were irregular, varying up and down almost daily. The price of silver per ounce reached 60⅜d.—a figure not touched for about sixty years. The Bank rate is 5 p.ct. as fixed on April 5, 1917.

The price of gas supplied by the Otley Gas Company has been increased from 4s. to 5s. per 1000 c.ft., as from the 1st ult. The shareholders' dividend, in spite of the increased charges, will, it is estimated, have to be reduced from 4½ to 2¾ p.ct.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares	When last Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 25, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
189,049	Stk	July 31	4	4%	Aldershot 4 p.c. Pref.	..	60—65	..
1,551,868	,,	April 8	2½	2⅞	Alliance & Dublin Ord.	59—64	45—55	..
374,000	,,	July 11	4	4%	Do. 4 p.c. Deb.	76—79	60—62	..
980,000	5	April 29	7½	8%	Bombay, Ltd.	5⅞—6⅜	5⅜—6½	..
50,000	10	Feb. 26	16	13%		29—30	19½—20½	..
883,110	10	,,	7	7%	Bourne- { B 7 p.c.	15—15½	10½—11½	..
115,000	10	,,	6	6/-	mouth Gas { Pref. 6 p.c.	13½—14	9½—10	..
159,740	—	June 27	—	4%	and Water { 4 p.c. Deb.	..	65—67	..
999,045	Stk.	July 11	14	37/-	Brentford A Consolid.	361—366	60—65	..
784,930	,,	,,	11	31/8	Do. B New	204—209	55—60	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	76—78	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—98	64—66	..
214,775	,,	Feb. 26	11	7½%	Brighton & Hove Orig.	208—218	137—142	..
344,200	,,	,,	8	5⅓%	Do. A Ord. Stk.	154—159	94—99	..
988,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
680,000	20	Mar. 26	12½	10%	British	44—45	30—31	..
120,000	Stk.	June 27	4	4%	Do. 4 p.c. Deb. Stk.	88—90	63—65	..
945,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	50—53	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	6½—6⅞	6½—6¾
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	5—6	7—7½	..
100,000	Stk.	June 27	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	61—66	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,618,280	,,	Aug 14	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	52—62*	..
500,000	,,	,,	5½	26.3	Do. 8½ p.c. do.	108—105	57—60*	..
475,000	,,	June 11	3	3%	Do. 8 p.c. Deb. Stk.	69½—71½	50—52	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	43—48	..
900,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	65—70	..
51,600	Stk.	Aug. 29	14½	13%	Croydon A 10 p.c.	..	155—165	..
378,400	—	,,	11½	9%	Croydon B and C 7 p.c.	..	130—135	..
499,370	Stk.	—	6	6⅓%	Derby Con. Stk.	128—135	..	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	..	..
1,009,180	10	July 30	10	5/0	European, Ltd.	17½—18	12—14	12½
16,998,975	Stk.	,,	4/17/4	80/-	4 p.c. Ord.	98 - 102	52—55	51½—53
2,600,000	,,	,,	3½	26/8	Gas { 3½ p.c. max.	76—79	47—50	..
4,062,235	,,	,,	4	4%	Light { 4 p.c. Con. Pref.	96—99	65—68	65—65
4,674,850	,,	June 11	8	8%	and { 8 p.c. Con. Deb.	73½—74½	52—55	52—53
180,000	,,	,,	10	10%	Coke { 10 p.c. Bonds	..	..	159½—159
82,500	,,	Mar. 12	5	4⅓%	Hastings & St. L. 5 p.c.	..	59—64	..
958,740	,,	—	3½	2⅓%	Do. 3½ p.c	37—39	44—49	..
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	16½—16½	12½—13½	..
86,600	Stk.	Sept. 12	9	8⅓%	Hornsey 7 p.c.	..	115—130	..
181,000	,,	Mar. 12	7½	6⅔%	Ilford A and C.	151—154	90—95	..
65,780	,,	,,	6½	4⅔%	Do. B	115—118	69—74	..
65,500	,,	June 27	4	4%	Do. 4 p.c. Deb.	92—94	61—64	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	127—132	126—130½
1,385,000	,,	Aug. 14	8½	3½%	Do. 8½ p.c. Deb. Red.	84—86	79 - 81*	79½—80
335,342	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	90—95	..
2,498,905	,,	Feb. 26	10	42/6	Liverpool 5 p.c. Ord. { A	211—213	..	..
					{ B	146—148		..
806,668	,,	June 26	4	4%	Do 4 p.c. Pr. Deb. Stk.	..	..	..
165,736	,,	Aug. 14	7/5/6	32½%	Maidstone 5 p.c.	..	56—61*	..
75,000	5	June 11	6	8%	Malta & Mediterranean	4½—4⅝	3½—3⅝	..
250,000	100	April 1	4½	4½%	Met. of { 4½ p.c. Deb.	99—101	91—98	..
541,920	20	May 29	4	5%	Melbourne {			
1,875,892	Stk.	July 30	4½	3½%	Monte Video, Ltd.	11½—12	12½—13½	..
599,705	,,	June 27	3½	3½%	Newcastle&Gatsh'd Con.	95½—99½	64—65	..
15,000	10	Mar. 12	—	11%	Do 3½ p.c. Deb	82—83	57—58	..
56,940	10	,,	7/14/0	7%	North Middlesex 10 p.c.	..	13½—14	..
800,000	Stk.	May 14	8	8%	,, ,, 7 p.c.	14—15	9½—9⅞	..
60,000	5	Mar. 26	10	1/-	Oriental, Ltd.	117—122	103—106	104½—105½
60,000	50	Feb. 26	13	7½%	Ottoman, Ltd.	7½—7⅞	4⅜—5½	..
100,000	50	,,	12	6½%	Portsea, Island B	128—131	76—81	..
249,990	£	April 29	8	—	Do. C	118—121	68—69	..
499,960	5	June 26	5	—	Primitiva Ord.	5½—6	1½—2	..
591,600	100	June 9	4	4%	Do. 5 p.c. Pref.	4½—5	3—3½	6⅓/3
600,000	Stk	July 30	4	4%	Do. 4 p.c. Deb.	91—98	71—78	71½
846,198	,,	June 27	4	4%	Do. ,, ,, 1911	..	49—52	..
150,000	10	May 14	6	6/-	River Plate 4 p.c. Deb.	85—87	49—52	..
125,000	50	July 2	5	5%	San Paulo { 6 p.c. Pref.	10½—11	7½—8	..
185,000	Stk.	Mar. 12	10	5%	{ 5 p.c. Deb.	47—49	40—42	..
209,984	,,	,,	10	5%	Sheffield A	228—234	83—87	..
528,500	,,	,,	10	4⅔%	Do. B	222—224	83—87	..
183,201	Stk.	Sept. 12	4	4%	Do. C	220—225	73—76	..
90,000	10	June 27	9	10%	Shrewsbury 5 p.c.	..	..	..
6,609,895	Stk.	Aug. 14	5/4/0	30/-	South African.	10½—11½	12½—13½	..
250,000	,,	July 11	—	5%	South Met. 4 p.c. Ord.	111—113	52—55*	51½—52½
1,595,445	,,	,,	8	8%	Do. Pref.	..	94—96	..
524,920	,,	Aug. 14	8½	5%	Do. 3 p.c. Deb.	73½—74½	52—54	53
952,795	,,	,,	6	3⅔%	South Shields Con. Stk.	157—159	97—99*	..
187,558	Stk.	June 27	5	5%	S'th Suburb'n Ord. 5 p.c.	114—116	73—76*	74
647,740	,,	May 14	7½	8%	Do. 5 p.c. Deb. Stk.	116—118	88—91	..
121,975	,,	June 27	4	4%	Southampton Ord.	99—102	68—68	..
120,000	,,	Aug. 14		4½%	Do. 4 p.c. Deb. Stk.	..	63—65	..
782,275	,,	,,	6	3⅔%	Tottenham { A 5 p.c.	135—138	83—88*	..
181,256	,,	June 26	4	4%	District { B 3½ p.c.	115—117	58—62*	..
189,880	10	Dec. 30	5	—	{ 4 p.c. Deb.	87—89	64—66	..
149,900	10	July 1	5	5%	Tuscan, Ltd.	5—6	1—2	..
986,476	Stk.	Mar. 12	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
					Tynemouth 5 p.c. max.	103½—109	82—84	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	,,	Feb. 26	8⅔	55/-	Wandsworth A 5 p.c.	151—156	88—93	..
255,698	,,	,,	6½	40/-	Do. B 3½ p.c.	129—134	65—70	..
108,075	,,	,,	—	38/6	Do. C	..	68—73	..
140,865	,,	,,	—	34/6	New Ordinary	..	68—73	..
852,000	,,	,,	6½	38/9	Wimbledon 5 p.c.	117—122	64—73	..
96,000	,,	,,	6⅔	40/-	Epsom 5 p.c.	121—126	70—75	..
88,416	,,	June 27	3	3⅓%	3 p.c. Deb. Stk.	66—69	49—51	..

* Ex Div.

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